This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

Sold by
J. STEWART,
[illegible] WILLIAM St.
Strand, London.

70. a. 7.

Sold by
J. STEWART,
[illegible] WILLIAM St.
Strand, London.

70.a.7.

Sam.l Knight.

but 150 copies of this work were printed.

AN

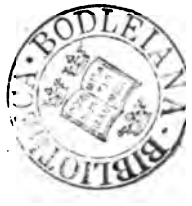
ESSAY

ON THE

PRINCIPLES

OF

HUMAN KNOWLEDGE.



By E. WARING, M.D.

LUCASIAN PROFESSOR OF MATHEMATICS IN THE UNIVERSITY OF CAMBRIDGE, AND FELLOW OF THE ROYAL SOCIETIES OF LONDON, BONONIA AND GOTTINGEN.

CAMBRIDGE,

PRINTED BY JOHN ARCHDEACON AND JOHN BURGES, PRINTERS TO THE UNIVERSITY.

MDCCXCIV.

PRINCIPLES

OF

HUMAN KNOWLEDGE.

ON IDEAS.

1. AN indefinite number of cauſes of ſenſation act on the mind at the ſame time, e.g. Light coming from ſeveral objects to the eye; particles of air affecting the auditory nerve, of which the motions are excited by the vibratory motion of the particles of bodies; cauſes of feeling from every body immediately ſurrounding us; of ſmell from all particles acting on the olfactory nerves; of taſte from every thing that affects the organ of it; and further different cauſes of ſenſation from all the internal parts of the body: the ſoul though ſurrounded by ſuch an amazing variety of things capable of producing ſenſations perceives at the ſame time only a few of them, which are excited by cauſes more forcible, more novel, more pleaſing, diſpleaſing or painful, or which for

ſome reaſons the mind is more inclined or compelled to notice.

2. Natural aſſociations of ideas reſult from the ſame property of one or all bodies exciting ideas in the different ſenſes, or parts adjacent and connected of the ſame body exciting different ideas in the ſame ſenſe, e. g. The tangible idea of diſtance is aſſociated with the viſible and theſe with the audible idea.

3. Accidental aſſociations are ſuch as have happened from accidental circumſtances to particular animals.

4. The memory retains in ſome degree theſe perceptions, and recollects the ideas accompanying and immediately ſucceeding each other: Two things connected together in our paſt experience, will either more or leſs be connected or aſſociated or ſucceſſive in the memory, and from the one we may often deduce the other with more or leſs facility, e. g. We are ſometimes puzzled to remember ſome word or matter, and in order to the finding it we endeavour to recollect every thing allied, to recollect the letter (ſometimes by recalling different letters of the alphabet into the mind) or ſyllable that begun or even ended &c. the word; or ſome circumſtance connected with the matter; and from this recollection we often find the word, or matter more or leſs accurately,

accord-

according as its remembrance remains more or leſs perfect.

5. The memory from ſome circumſtances often does not recollect others allied, but from other or ſeveral others united may: e. g. We often from the name cannot recollect our paſt knowledge of the perſon, or the name from ſeeing the perſon, but from this we may remember to have ſeen him before; and ſometimes though we do not recollect him from ſeeing his perſon, we remember him from ſeeing his perſon and other circumſtances.

6. By memory our ideas are aſſociated together, and from thence ariſes all our knowledge and converſe: it is the foundation of our knowledge, for by it we argue from the paſt to the future; and it is the foundation of our converſe, for by hearing the diſcourſe of another, we are led to the recollection of ſomething analogous to what has been ſaid, which we return in anſwer: the mind from its faculties often annexes ideas together, which were never before aſſociated in the memory.

7. The mind in all its faculties is limited, it can only diſtinguiſh even ſimple ideas to a certain degree, which conſiderably differs in different perſons; e. g. The difference between two colours or two ſounds nearly the ſame, or two angles or magnitudes nearly equal, can often

not be perceived; and when the mind can perceive no difference between colours or ſounds, angles or magnitudes, it will conclude them to be the ſame or equal.

It is known, that the rays of light coming from the ſame point of an object do never perfectly unite on the ſame point of the retina, but intermix with rays coming from adjacent points; and if they do not ſeparate too much from each other, or the force of the rays coming from the other points bear too great a ratio to the force of the rays from the firſt mentioned point, the viſion will be diſtinct and not to be diſtinguiſhed from perfect viſion; in which all the rays from one point of the object are ſuppoſed collected in the ſame point of the retina and not intermixt with other rays; and the ſame may be predicated of all correſpondent points.

The like may be affirmed concerning ſounds and ideas ariſing from the other ſenſes; and this limitation of our faculties may hereafter become the ſubject of calculation.

8. Several cauſes, which produce ſimple ideas, may when united and acting together on the ſame point of the body or nearly, produce one ſimple idea in the mind, and that moſt frequently not the ſame with any of the beforementioned, e. g. The cauſes of ſeveral colours united

united on the ſame point of the retina generally produce a different colour; and ſo of ſeveral ſounds united on the ſame point of the auditory nerve; and conſequently the cauſe of a ſimple idea is often reducible into ſeveral cauſes of other ſimple ideas.

9. The ideas received in the mind are not only different as the object from which they proceed is different, but alſo as the conſtitution of the organ of the precipient is different; e. g. Let a man have a microſcopic eye, or which is the ſame, view the object by help of a microſcope, how different does it appear from that ſeen by the common or naked eye? the ſame object is calculated not only to give different ideas to different ſenſes; but alſo to the ſame whether ſeeing, hearing, &c. in different perſons; or to the ſame perſon at different times, or with different inſtruments interpoſed, which may greatly vary the ſenſation.

10. Amongſt the innumerable ſimple ideas, which ariſe from the different ſenſes, hearing, ſeeing, taſting, feeling, ſmelling; no two are ſimilar: the ideas of extenſion, figure (a particular mode of extenſion), and motion received by the eye are quite different from thoſe received by the touch; but being found generally to accompany each other, as they are produced by the ſame body, we aſſociate them together, and give them the ſame name.

11. Innu-

11. Innumerable ſympathies from nature pervade the body (as is known to all the faculty of phyſick), which are often different in different conſtitutions: innumerable aſſociations of ideas ariſe from nature, from cuſtom and habit and from artifice; ſome ideas of ſight give pleaſure to the whole, and ſome to parts of the body; others produce diſguſt, horror or pain; ſome ſounds create pleaſure to the whole conſtitution, others tremblings, rage, fright, &c.

12. Some are general aſſociations; for example, when the ideas are derived from the ſame cauſe; the idea of extenſion from ſight and touch; of a carriage from the ſound of it: others belong only to particular perſons occaſioned either by their conſtitutions or particular events of their lives; general aſſociations of ideas and of facts deducible from uniform experience conſtitute the foundation or principles of human knowledge. All languages conſiſt in the aſſociation of ſounds with other ideas.

13. As the ſame machine to a perſon ſkilled in its ſeveral parts appears much more complicate than to a perſon ignorant of them, who knows not how to diſtinguiſh the different parts; ſo an idea may appear more complex to one than another; and probably the idea, which firſt enters the mind muſt be ſimple; afterwards the mind

mind receives ideas, which agree in ſome but differ in other parts, it then ſeparates the parts which agree from thoſe which do not; and the ſimple idea becomes a complex one; theſe may be called complex in their nature or ſubſtances: arbitrary ones are formed by adding ſeveral ſimple ideas together.

14. Ideas and effects which always accompany each other, are ſuppoſed to be derived from the ſame cauſe, e. g. If a body is interpoſed between our two hands they cannot come together, this is an effect not a ſimple idea probably produced by the body interpoſed between the hands; if the ſenſation produced in the mind by feeling be called ſolidity, ſolidity in one body will be quite different from ſolidity in another, and neither one of thoſe can be proved to be the cauſe why the hands do not come together; but it may be ſaid, that what produces them likewiſe keeps the hands from coming together, the conſequence is that they may both be concluded properties of the ſame body, but no more deducible than other properties from each other.

15. Extenſion is a property of all bodies, the idea of it is acquired by the touch: and all its meaſures as inches, feet, yards, miles, &c. derived from thence.

16. From the ſame cauſe, as before ſaid, is derived

derived a correſpondent idea by the ſight which always accompanies the former; when different ideas are derived from the ſame cauſe, we aſſociate them together in our mind as we find them from experience, e. g. We have found bodies greater to the touch when the picture on the retina is greater, if the diſtance from the eye be the ſame; we therefore judge of the greatneſs of one from the other: from the angle which the objects ſubtend at the eye, the light and ſhades, diſtinctneſs and greatneſs, &c. of a known object, do we judge of its tangible diſtance, ſize and ſhape according to paſt experience; and the ſame principles which we have deduced by experience from known objects do we apply to unknown: in general from an idea of one ſenſe, we can ſeldom judge with much accuracy and preciſion concerning an idea excited from the ſame cauſe through a different ſenſe; but in the caſe of our ideas of extenſion from ſight and touch there is an exception, by making uſe of both together: we are able to extend our meaſures by touch alone to a ſmall diſtance, but by taking two different angles by inſtruments accommodated to the ſight, at a proper and known tangible diſtance from each other; and the ſame for more angles and diſtances; and by ſuppoſing the motion of the earth and heavenly bodies to be conformable to paſt obſervations

and

and experience we can extend this meaſure to diſtances almoſt as far as imagination can reach, and prove that the eye extends its view to inacceſſible diſtances, to millions, billions, and trillions, and a ſpace equal to ſextillions or nonillions of miles; but to how much further the naked eye, and much more aſſiſted by teleſcopic inſtruments, views, can never be inveſtigated: ſtupendous, immenſe, perceptible ſpace! through the whole of which are interſperſed indefinite ſyſtems of bodies equal to our own; how ſmall and contemptible is the world which we inhabit to our ſyſtem of Sun, Planets, Comets and Satellites? how little the ſpace that a ſingle perſon inhabits to the world? infinite creation! yet every part connected, communicating, affording light, and probably attracting and giving vigour, &c. to each other; therefore only one infinite machine, proving by the communication of its parts, the omnipotency and the unity of its ſupreme Architect; power infinitely ſuperior to human comprehenſion.

17. But great, infinite as the creation is in its extent, it diſplays in its ſmalleſt parts, in man, in other terreſtrial animals equal power in miniature; the number of veſſels carrying blood and various other juices, of glands ſecreting them, of nerves affording life and action to every part of the fibres which conſti-

tute the muſcles, veſſels and other parts of the body is never to be inveſtigated, I may venture to ſay, that they are innumerable; the whole world filled with animals innumerable, moſt of them imperceptible by us, as is probably all the other creation.

18. Such is the infinite power of the Creator, nor is his wiſdom and goodneſs leſs diſplayed, were we endued with faculties able to comprehend them; i. e. Were the underſtanding equal in force to the ſenſe; infinite wiſdom and goodneſs always accompany each other. Wiſdom conſiſts in ſeeing what is neceſſary for the well being of any animal, goodneſs in giving the means affording it; from the goodneſs therefore given we deduce the wiſdom. At a great diſtance worlds to our view are crowded into points, and only can barely be ſeen, not the living animals or various other parts contained in them, and conſequently not their contributing to the well being of each other. Our ſenſes are not calculated to afford us much inſight into things at a great diſtance which could be of no benefit to us, our underſtanding is limited even to the knowledge of a very ſmall part of the wiſdom diſplayed in the things with which we are ſurrounded and converſant. Our minds are better formed to ſee the uſes, than to examine the mechaniſm

from

from which they are produced; and we feel and are more convinced of the utility of any thing by being deprived, than by conſtantly enjoying the benefit of it: e. g. Let man be deprived of food, he ſoon becomes well convinced of the utility of it for the ſupport of life; let him be deprived of a leg or an arm, and he ſoon perceives how uſeful it is to his well being; let him be deprived of his heart, his lungs, &c. and it ſoon appears how neceſſary they are to his continuance in life: cut off the extenſors and flexors and muſcles of the legs, arms, &c. and it will immediately appear how neceſſary and uſeful they are to the extending, bending and moving of their reſpective parts; cut off the blood veſſels belonging to any muſcle, and the muſcle immediately becomes inactive; cut off the nerve of any part, and it loſes its life and motion; in the ſame manner we may deſcend to the inferior veſſels and parts, and ſhall find them all neceſſary to the ſupport and well being of the ſuperior; and this may be carried perhaps in infinitum, could our ſenſes afford us information ſo far downwards.

The mechaniſm therefore infinitely ſurpaſſes our underſtanding; which extends not ſo far as from the parts in the leaſt to inveſtigate their uſes, but it deduces their uſes as before ſeen from a deprivation of the parts.

19. We judge of the wiſdom and utility of a machine from the effects produced, and the contrivances employed in producing thoſe effects.

The effects produced, are every thing in the creation that we know and all beyond our knowledge; in ourſelves are life, ſelf-motion, underſtanding and will; faculties beyond which the human comprehenſion cannot proceed, and never to be produced by us; and the contrivances are infinitely above our underſtanding, ſuch as no human mechaniſm can in the ſmalleſt degree equal, nor human ſagacity conceive, but infinitely ſuperior to both; indeed all our knowledge, our power and abilities are given and contained in the above effects.

Can Omnipotence, and Omniſcience, proceed from weakneſs and ignorance? do not the power, and wiſdom, diſplayed in the works of the Creation, their mutual connection with each other, demonſtrate the infinite power, wiſdom and goodneſs, the unity and omnipreſence of its Creator?

20. And yet notwithſtanding the unbounded creation mentioned, perhaps for any thing that we know to the contrary, there may exiſt a ſpiritual world, not to be ſeen by our ſenſes and our place of exiſtence in a future ſtate.

21. The ideas of ſounds and all other ideas, that

that can be received from a body at a diſtance and vary with the diſtance, may be ſaid to be connected with the tangible idea of diſtance; the more diſtant the body, the leſs the light, the ſound, and ſmell, &c; we may alſo from theſe ſenſes judge ſomewhat of the ſize of the body; for the larger the picture on the retina, the more light, the louder the ſound, the ſtronger the ſmell, &c. the larger, cæteris paribus, is generally the body: from theſe different ſenſations, therefore, we may form ſome judgment, probably very inaccurate from want of ſufficient experience, concerning the diſtances and ſize and figure, &c. of the bodies: the more widely different the ſenſation at different diſtances, the more ſenſible at every diſtance, the greater experience, and the more attention either from utility, nature, or any other cauſe paid to theſe ſenſations and their correſpondent diſtances; and the greater the memory of ſuch matters either from nature, or acquired by habit, the more accurate will be the judgment concerning the tangible diſtance; the ſight, for theſe various reaſons, beſt judges of the tangible, and is the only ſenſation that extends to a very conſiderable diſtance; the ſound claims the ſecond place; from the difference in time between the ſight of any action of an object, and the hearing of that action, we can judge in ſome degree of the diſtance of the object;

ject: the ſame may be affirmed of the ſenſations from the ſmell, &c. for they are principally conveyed to the mind by the air.

ON THE FACULTIES OF MAN.

1. The mind, as ſome commentators on Euclid have obſerved, derives its ideas from ſenſation or the organs of the body, reflection and memory.

2. The ideas from ſenſation firſt enter the mind, it neither creates nor alters them, nor à fortiori communicates them to others; they muſt go to the external objects to acquire them; whether thoſe ideas are exactly the ſame in two different perſons, or in the ſame perſon at different times, has been before determined; but they are ſufficiently analogous to produce correſpondent ideas.

3. The mind reviewing thoſe ideas of ſenſation, compares ſome of their qualities together, whence it acquires the ideas of relation: if the ideas compared together are derived from ſome particular bodies, we get ideas of compariſon, as brighter, whiter, acuter, louder, ſweeter, (which is applied both to taſte and ſmell, though there is no aſſociation unleſs in the name between them, which is the caſe of many words), &c: the compariſon may be of different degrees, as their difference may be little, much,

much, very much, &c. but rarely becomes the ſubject of calculation. Theſe all depend on the greatneſs, the vividneſs or ſtrength of the ideas excited in the mind.

The relation is contained between two or more ideas, and without thoſe ideas being in the mind, the relation cannot be perceived. This relation, to uſe Mr. Locke's language, is the agreement or diſagreement of ideas, &c. The perception of it is knowledge: many relations are contained between all or very many ideas, and may be called univerſal or general propoſitions.

4. There are relations, which are not acquired from any quality or property inherent only in ſome particular bodies, but equally from all ideas of the mind; and conſequently cannot be ſaid to be produced in the mind by any quality of the body or ſenſation, but rather by reflection of the mind itſelf; of this kind are the ideas of identity and diverſity, exiſtence and coexiſtence; number as one, two, &c; time (by the ſucceſſion of ideas preſent, paſt and future); thinking by reflecting on the ideas of the mind (bare perceptivity includes every ſenſation), volition, &c. and this may be done by different degrees from bare perceptivity or ſimple apprehenſion to the higheſt ſtretch or degree of attention poſſible; and from irreſiſtible deſire to the ſlighteſt inclination.

5. Affections

5. Affections and paſſions of the mind are neither ſenſations from external objects, nor perceptions of ſome of their relations, but, if I may ſo term it, feelings (not the ſenſations of the touch) from ſome properties of them or their relations; and only to be acquired and defined by mentioning the cauſes which produce them, and referring to the feelings excited by thoſe cauſes, e. g. Joy and grief, pleaſure and pain, which often originate from the mind; ſublimity from the grandeur of a ſenſation on the ear or eye exciting a more ſtrong impreſſion; beauty from ſome pleaſing ſenſations from objects to the eye; pity from viewing and reflecting on living animals in pain or diſtreſs; love, being a pleaſure received from one of a different ſex; friendſhip from one of the ſame or different; anger from a conception of ſome injury offered; gratitude from ſome good received from another perſon; a ſenſe of piety from the conſiderations of the power, wiſdom and goodneſs of the Supreme, and our dependence on him, and ſome feelings either greater or leſs almoſt from every object and relation.

6. The mind can retain the ſame ideas in it for more or leſs time, but it is limited in every thing; it can think only on one ſubject at once, and other ideas will obtrude themſelves contrary to its will: the attention of any man may be

be greatly increaſed by frequently reflecting on a ſubject for ſome time together.

7. The idea of the will is acquired from the power a man has of retaining his ideas, or letting them paſs; of conſidering their relations or not, &c; and principally from the power of the mind on the actions of the body; it can make the body or ſeveral parts of the body move in any direction or prevent their motion; it can perform ſeveral actions or not perform them: the powers of man are here very much limited; he may will or deſire things, which he cannot attain; and even the will or deſire is in ſome degree limited, and from duty ought to be more ſo.

Many things influence the will of man, and even ſo much as to produce a very great probability, that the man will follow their directions; motives influence but not compel, e. g. The avoiding pain, the procuring pleaſure, the paſſions, ſelf preſervation, &c: man ought in every thing to ſubject his will to the will of God; but in things of leſs moment, where no command is given by the *Supreme* or can be deduced, he may govern himſelf by his own eaſe and happineſs according to his will directed by his feelings and underſtanding.

Much has been argued on the freedom of human will; what is meant by human will,

but the power man, as before ſaid, has of walking or not walking in any manner; acting or forbearing to act, or acting in a different way; converſing on one ſubject or other, or being ſilent; &c. that a man has ſuch a power ſeems to follow from his having framed a word to expreſs it, by which he means ſomething in oppoſition to neceſſity; but as all our knowledge is deduced from experience, every man muſt determine for himſelf; if he finds himſelf neceſſitated to walk or act in the very manner he does, and that it is not in his power to do otherwiſe, as much as it is not in his power to fly; all the words in the world will never convince him that it is, no more than reaſoning will prove to him that it is in his power to fly; but if from his own experience and obſervation he finds that he can either do one thing or the other, and that the Lord and Governor of the univerſe orders the one; then he becomes accountable to that being for his acting, or not acting agreeable to his commands.

8. It has been urged that ſuch freedom of action is incompatible with the divine foreknowledge; whoever advances this propoſition muſt ſhew that there is an expreſs contradiction contained in the terms; which no one can: the powers given to man may be ſhewn as far to exceed his comprehenſion as the compatability

bility of divine foreknowledge and freedom of will; I may venture to ſay that probably innumerable attributes of the deity unknown to us, and all carried to their utmoſt extent, ſurpaſs human comprehenſion: nothing is impoſſible to omnipotence; the impoſſibility muſt be contained in the contradictory terms. In this caſe human underſtanding can go a great way, can frame a probable conjecture of the actions of a man, with whoſe character they are acquainted, though the man is perfectly free in thoſe actions: but what is probable with man in ſome caſes, is certainty with God in all.

9. It has been further argued that every effect has a cauſe, if it be ſaid a neceſſary one, it is begging the queſtion; if a voluntary one, the queſtion is granted: if the effect be the acquiſition of motion from one body ſtriking another, the law is of courſe given by the ſupreme to the ſtriking body to communicate ſuch a degree of motion to the body ſtruck, as probably there is no neceſſary connection between cauſe and effect; if it be aſked what is the cauſe of the one body ſtriking the other; it may be anſwered, its motion acquired from the ſtriking of other bodies, and ſo on (unleſs voluntary cauſes intervene) till we come to the creation itſelf and conſequently to its creator.

10. If the effect be the motion of the body from

the action of the ſoul on it, then the cauſe of the action of the ſoul on the body is a voluntary one, viz. the will of the ſoul, i. e. a power given by the ſupreme to the ſoul of acting on the body, or not, according to its own determination or choice; but does any one doubt that the Almighty could have given ſuch a power? Is there any contradiction contained in the terms? and if there is none he certainly could have given ſuch; the enquiry therefore is, whether he has given it, of this every one muſt judge for himſelf from his own faculties.

11. It has further been ſaid, that motives always determine the mind: motive is a general word; in deducing general propoſitions we argue concerning ſome particular, which ſame argument we perceive may be applied to every particular contained in the general term; and if it is true of every particular, we conclude it to be true of the general: hence our reaſoning concerning general propoſitions, can only be from particulars; in this caſe let the particular motive be the ideas or thoughts of walking this way or that way; which of theſe two can be called the motive, for they are both equally contained in the mind? is the mind compelled from theſe ideas contained in it, either to go one way or the other? this motive muſt neceſſarily act before the determination of the mind, for if it

does

does not, it means only the determination of the mind, not a motive: but if every thing has a cauſe, the motive muſt have a cauſe; and if the motive has a cauſe, it can be no other than the abovementioned thought of walking one way; but what is the cauſe of or determines the motive, determines the will; and therefore this thought determines the will: but to put an end to trifling, the uſe of general names inſtead of particular things ſometimes produces confuſion in our reaſoning.

12. The feelings or ſentiments ariſing from moral relations are greatly different in different perſons, e. g. The reverence impreſſed on the mind by the name and attributes of the deity, dread and affection, gratitude, benevolence, the zeal and ſatisfaction for doing and from having done our duty; the ſorrow and repentance for the neglecting or acting contrary to it; theſe may be increaſed or diminiſhed by the will influencing more or leſs attention to them.

13. Pleaſure and pain alſo are different in different perſons, thoſe from ſenſation depend principally on the ſenſibility of the conſtitution and the part affected, and can only be diſtinguiſhed to a certain degree: the pain is rendered more acute by the part being inflamed, and leſs ſo by its being paralytic; even theſe the frame of mind may ſomewhat increaſe or diminiſh: joy and grief,

pleaſure

pleaſure and pain, often originate from the mind.

The pleaſure ariſing from the conſciouſneſs of having done our duty, benevolence, &c. is of the pureſt kind; from profaneneſs, malevolence and immorality (if there may be found perſons, who have pleaſure in them as ſuch) is of the moſt horrible and baſe kind: there are pleaſures from being occupied in buſineſs, trade, &c. from the diſcovery of truth, from the imagination receiving or creating thoughts which are pleaſing to the mind, from wit and humour, from the removal of pain or any evil, from converſation and agreeable company and entertainment, from the praiſe of men, from the expectation and deſire of any particular pleaſure, from ſelfiſhneſs or the thoughts or wiſh of any thing accruing to our advantage, from feelings, &c; and pain and unneaſineſs from ſome of theſe as well as the contrary. Theſe pleaſures and pains may be all different in kind and degree in the ſame, or different men

14. The ideas acquired from ſenſation are quite different from thoſe, which the memory retains, they can hardly be ſaid to have the leaſt reſemblance: from a ſtroke on the eye or caſual occurrences probably from ſome action on the retina, ideas of the ſight are excited as vivid and clear as from ſenſation itſelf; or ſometimes even

even more ſo: when we are awake our ideas are always paſſing in review before us; but even in the enſuing day, we do not remember the $\frac{1}{100}$th part of the ideas or propoſitions that were in our thoughts the day before; as a microſcopic eye would render us unable to view objects at a diſtance, (a ſimilar propoſition may be aſſerted of the ear, &c.), in like manner if the memory was more retentive and recorded all the trifles that paſſed, the mind would be too much and to no purpoſe incumbered with them; and ſince we cannot think or reaſon on more than one thing at once, the retaining of them would be of no uſe, it would render us incapable of conducting the things moſt material; and as our time is not much more than ſufficient for that purpoſe, therefore it is more advantageous to forget than remember them: all our ſenſes are calculated for the greateſt utility in our preſent ſtate, but nature wiſely uſes a conſiderable latitude in all her operations.

15. Sometimes the moſt material and ſtriking things are recollected, not without difficulty; and were there no other means of preſerving the recollection of paſt events than the memory of man; almoſt every thing, that ever entered his mind ten years paſt, would be entirely forgot,

forgot, (matters of much moment are generally recollected and repeated from time to time), and accounts of buſineſs between one man and another could not be long kept; and even affairs of the greateſt moment, viz. religious, would ſoon die away, as would every thing elſe, but what is neceſſary for our ſubſiſtence, and muſt be conſtantly tranſmitted from one to another: we ſhould be ſunk into the ſtate of barbariſm, which pervades the original natives of Africa, or America; but art or a benevolent and good being, by whom all uſeful arts are given to mankind, has ſubſtituted another memory, and ſupplied by letters the defect; and afforded the power of continuing every thing uſeful, not only during our own lives, but through after generations.

16. The ideas of ſenſation contained in the memory, as is before mentioned, can hardly be ſaid to be a reſemblance; but the ideas of the general relations abovementioned, ariſing from all ideas whatever or rather from reflecting on them, muſt be equally clear to the mind, whether any other ideas are contained in it or not.

17. The memory, as all the other faculties, may be improved by proper exerciſe of it, that is by learning, particularly in our younger age, to repeat leſſons contained in books, &c. But though it will be improved in general, yet it will

will be more particularly ſo in things allied to the leſſons themſelves: attention and repetition fix things in the memory; by the firſt reading men of moderate abilities acquire and retain but little knowledge on a ſubject in which they were not converſant before, but repeated readings make it their own; and ſometimes events, &c. may more eaſily be remembered from ſome technical words or verſes framed for the purpoſe, of which a key is given, or from many other marks or ſigns: the more frequent, the leſs diſtant in time, the more vigorous our attention, and the more our ideas are allied to others in which we are converſant, the more eaſily ſhall we recall and review them in our mind and their order, accurately and diſtinctly: the reflecting with great attention on one thing for a conſiderable time tends to obliterate others, things of greater moment to obliterate thoſe of leſs.

11. In the delirium ariſing from a fever and ſome other diſorders, the mind cannot command the ſucceſſion of its ideas, nor the ſubject of its thoughts; it will rove on things, which perhaps have been entirely forgot for a long time: I knew a perſon, who in that ſtate repeated in his mind verſes of ſome of the Engliſh poets, or compoſed new rhymes as faſt as his ideas could well ſucceed each other, both of which he was unable to perform, when freed from the deli-

rium: a gentleman of undoubted veracity aſſured me, that in a delirium he conſtantly roved on paſſages from novels, which he was not able to repeat before or afterwards.

12. Knowledge has been defined to be the perception of the agreement or diſagreement of our ideas; but what is meant by the agreement or diſagreement of our ideas? does it mean their relation to each other, either affirmative or negative? and in ſuch general expreſſions, not eaſily to be defined, does not the latter ſeem to carry with it a more general ſignification? e. g. Agreement in lines ſeem to imply equality, and diſagreement inequality, not other relations; if ſo, may not knowledge more properly be defined the perception of the relations of our ideas? or perhaps in this manner, the perception of the properties of ſubſtances and their relations, and the relations of our ideas and feelings? but definitions, expreſt in ſuch general terms not eaſily comprehenſible, ſeldom can be ſaid to be of much utility.

ON FEELINGS.

1. Senſations and relations are generally correſpondent in man, they may be ſtronger and more impreſſed on the memory by a greater attention of the mind, but in moſt other reſpects do not much vary.

2. The

2. The feelings are denominated from the cauſes which produce them; but thoſe ariſing from the ſame cauſe are often widely different, or even oppoſite in the ſame perſon at different times, and in different perſons.

3. The moſt forcible and violent, are called the Paſſions, and diſtinguiſhed according to their cauſes, as beforeſaid, and not from the feelings in the mind: e. g. Love, excited by viewing one of a different ſex; anger, by ſome action of another perſon; but, in conformity to what has been before aſſerted, the cauſe which produces love in one, may create averſion in another; or that which creates anger in one, may not irritate another.

4. Thoſe from our moral duties, as gratitude, filial reverence, benevolence and piety, are in men of exalted goodneſs and piety of the firſt degree of ſtrength and force, in moſt men of the ſecond, and in bad men of little or none.

5. All our feelings may be altered, corrected, exalted, or debaſed, by various cauſes, circumſtances and reaſons; and confirmed by habits.

6. The pathetic being excited by the conſiderations of ſome living animal in preſent, or likely to be in ſome future diſtreſs, will be a paſſion when ſtrong, when weak a bare feeling, a moral one if it ariſes only from duty.

7. Pleaſing feelings are forcibly excited from the

acquiſition of very uſeful and deſireable objects, from eſteem and other cauſes; and in ſome degree from moſt ſenſations, from novelty, variety, different diſpoſitions of parts, and the generality of things occurring. Diſpleaſing from their oppoſites. They are probably given us for general uſe, and we may commonly deduce what ſources are agreeable and what are not, from ſcrutinizing their uſes to mankind; e. g. Novelty is a pleaſing feeling, particularly in young perſons, probably given for an incitement to acquire knowledge neceſſary for their future well-being.

8. If beauty and ſublimity were defined to be whatever is pleaſing to and forcible on the mind, then would beauty be contained in the generality of things, and the paſſions would be the moſt ſublime; but they muſt be defined, as all other feelings are, from their cauſes: theſe cauſes have not been accurately defined, and conſequently it cannot in general be ſaid what is ſublime and beautiful, and what is not. Are theſe cauſes contained in ſenſations, or the underſtanding, or both? If beauty is derived from the ſenſations of ſight alone, is it not from a a pleaſing light and colour? If ſublimity is excited by the ſenſations of hearing and ſeeing, does it not conſiſt in the grandeur of the ſound, or the greatneſs and light and colour

of

of the object? But if beauty and ſublimity is contained in the ſenſations and ſentiments, then may not the former be ſaid to be an object pleaſing by its light and colour; and in its qualties, proportions and order, agreeable to utility and nature? and ſublimity, the latter, with grandeur and greatneſs? but if the ſenſation be only contained in the memory, and conſequently cannot in itſelf have any great impreſſion, then it muſt be principally from the ſuperior excellency of ſentiments in the one caſe connected with pleaſingneſs, and in the other with the grandeur of its objects. The attributes of the Deity, his power, his wiſdom, his goodneſs, are the moſt ſublime conceptions, and perhaps that of Mr. Huygens, that innumerable ſyſtems of worlds are diſperſed through the creation (God ſaid, Let creation be, and innumerable worlds aroſe) is the moſt ſublime thought that ever entered the mind of any perſon not inſpired: it has truth, utility and grandeur united; it carries our thoughts beyond our conceptions: in contradiction to truth and nature no thought can be excellent.

9. It has been ſaid, that terror is the principal ſource of the ſublime; if this be the caſe, then a perſon preſenting a piſtol to the breaſt is a ſublime object: but thunder is a very grand and ſublime ſound; take away the ſound, and would the

the terror or fear of the danger be eſteemed ſublime? but every one may affix whatever meaning he pleaſes to the term, the feeling will be different in different perſons, and vary with repeated uſage.

10. The ideas from memory almoſt immediately following the ſenſations have no reſemblance to them; for if they had, we ſhould not be able to diſtinguiſh between the preſence and abſence of the object: but it is different in feelings; for ſtrong feelings generally continue for a conſiderable time (in ſome longer than in others), but commonly grow more weak by time and company.

ON THE IMAGINATION, &c.

1. The mind can recall different ideas into its view, into itſelf, from its ſtorehouſe the memory; and join them together in whatever manner it pleaſes, and further examine their nature and relations; whether they are pleaſing, &c. and whether agreeable to nature and truth.

The recalling them into the mind may be named general recollection, the joining of them together may be ſtiled imagination or fancy, according as it creates images or figures, &c. or connects them in any other way that the mind pleaſes: reaſon examines their agreement to nature and truth; and invention finds new relations

lations conformable to them between different facts and ideas.

By the faculties are denoted the actions and paſſions of the mind.

2. Man has not only the power of recalling ideas into his mind at the preſent, but alſo to ſome degree of fixing what he will reflect on at a future ſtated time; he lies down to ſleep, with a reſolution that he will recover his ideas in ſix hours, he accordingly wakes about that time more eaſily if it be his accuſtomed time: man likewiſe determines to conſider ſome matter, or perform ſome buſineſs ſix days hence, he very ſeldom fails in this, unleſs by change of inclination, or ſomething happening in the mean time, which prevented him. A power to us neceſſary, but incomprehenſible; but ſo are all given, traced to their origin.

3. If man was not endued with ſuch a power, he could not be accountable nor conduct himſelf through life; for he could not ſay, what would be the ſubject of his thoughts at any future time.

4. If the mind keeps any idea or ſubject in it for any conſiderable time, there will neceſſarily accompany it many things ſimilar or allied; but when the mind's attention is not fixed much on any thing, there will enter it a great variety of things often of little uſe.

ON HUMAN KNOWLEDGE.

1. There is no neceſſary connection known to us between cauſe and effect.

Can any perſon by reaſoning independent of experience from the cauſe deduce the effect: no one ever has, and conſequently to mankind there is no neceſſary connection known between cauſe and effect.

2. Is it probable that any neceſſary connection is contained in their own nature?

When the Omnipotent created the world, he probably aſſigned to all things in it their connections during their exiſtence; e. g. 1. That action and reaction ſhould be equal and contrary. 2. That one body ſtriking another ſhould, in given circumſtances, communicate to it a certain degree of motion. 3. That ſome ideas in the mind ſhould always accompany or ſucceed others; but could not the Almighty have aſſigned different connections? From his Omnipotence, I argue, that he could; and if this could have been the caſe, there is no connection in their own nature between cauſe and effect; and conſequently the latter is not neceſſarily ſubſequent to or deducible from the former, but entirely dependent on the Almighty fiat.

3. Some of theſe connections are ſuch, that even the poſſibility of them ſeems to exceed the human

human comprehenſion, and would not be credited, were they not warranted by experience; viz. the actions of the body following the will of the mind; e. g. We deſire to move a body, and in order to produce this effect we muſt contract or extend to a certain degree ſeveral muſcles, conſiſting of almoſt innumerable fibres; but to contract or extend the fibres of theſe muſcles, a proper quantity of nervous influence muſt be applied to each, and a due quantity of blood and other fluids injected into or expelled out of them; we are ignorant of the quantity and application of each of theſe, and of the connection between them, i.e. we are entirely ignorant of the means, which appear almoſt infinitely complicate, and yet when the parts are not diſordered, never fail to produce the end. Could an architect build an elegant and uſeful houſe, or raiſe a great weight by a wiſh, or by uſing means without any knowledge of them, though well acquainted with the materials; ſhould we not eſteem it the work of an inviſible agent? we muſt from a parity of reaſoning, conclude the effect produced from a wiſh by a being totally ignorant of the means to be applied, a work of the ſame nature; and by how much the more complicate and difficult are the means, by ſo much will the action appear more wonderful; and ſuch powers which are far beyond

our comprehenſion, and ſeem to us almoſt impoſſible, can only be given by the ALMIGHTY.

4. Since no neceſſary connection is known to us between cauſe and effect, all our knowledge on that ſubject can only be deduced from experience.

5. The firſt principles of ſome ſciences generally ſtiled ſelf-evident or intuitive, from which the demonſtrative propoſitions (being included in and conſequently deducible from them) are derived, ſeem to have the ſame origin: e. g. Two things which are equal to a third, are equal to each other, is eſteemed a ſelf-evident propoſition; but is probably acquired by putting two things which are equal or agree to a third, on each other, and finding that they are equal or agree together: ſimilar reaſoning may be applied to ſeveral axioms of Euclid.

6. From experience we learn, that definite cauſes produce or precede definite effects; and further, what effects united are preceded by certain cauſes.

7. By experience we conclude from things paſt to the future, and when the analogy is properly inſtituted, i. e. the preceding circumſtances or qualities are well known and all agree, the events ſeldom or never differ; the more the preceding qualities are which agree, the greater on that account the probability of the

the events being the ſame; but from human reaſon there cannot be aſſigned the leaſt ground for the concluſion, e. g. From the ſun's having riſen ten thouſand days, we argue that it will very probably riſe on the ſubſequent; but who can give any proof of this opinion? I know that ſome mathematicians of the firſt claſs have endeavoured to demonſtrate the degree of probability of an event's happening (n) times, from its having happened (m) preceding times; and conſequently that ſuch an event will probably take place; but, alas, the problem far exceeds the extent of human underſtanding: who can determine the time when the ſun will probably ceaſe to run its preſent courſe?

8. From greater experience we generally conclude a greater degree of probability, though we cannot aſſign a reaſon for it.

9. All reaſoning on probability is founded on ignorance; if we know no reaſon for the contingency of one event in preference to another, we conclude the probability of the former event's happening, as far as our knowledge extends, to be equal to that of the latter.

10. 1. If there are two different arguments entirely independent of each other in ſupport of a fact, whoſe probabilities let be $\frac{p}{a}$ and $\frac{q}{a}$; then will the probability in ſupport of the fact reſulting

ing from both arguments be $1-\frac{(a-p)(a-q)}{a^2}$; for, if the probabilities in ſupport of it are reſpectively $\frac{p}{a}$ and $\frac{q}{a}$, then will the reſpective probabilities of its failing be $1-\frac{p}{a}=\frac{a-p}{a}$ and $1-\frac{q}{a}=\frac{a-q}{a}$, and conſequently the probability of failing from both will be $\frac{a-p}{a}\times\frac{a-q}{a}$, whence the probability of the fact reſulting from both arguments will be $1-\frac{a-p}{a}\times\frac{a-q}{a}$.

In like manner, let there be (b) independent arguments in ſupport of the fact, of which the probabilities are reſpectively $\frac{p}{a}$, $\frac{q}{a}$, $\frac{r}{a}$, $\frac{s}{a}$, $\frac{t}{a}$, &c.; then will the probability reſulting from the whole $=1-\frac{(a-p).(a-q).(a-r).(a-s).(a-t).\&c.}{a^b}$ $=P$.

2dly. If there are b' independent arguments againſt the abovementioned fact, whoſe probabilities let be $\frac{p'}{a}$, $\frac{q'}{a}$, $\frac{r'}{a}$, $\frac{s'}{a}$, &c.; then the probability reſulting from all the arguments againſt the fact $=1-\frac{(a-p').(a-q').(a-r').(a-s').\&c.}{a^{b'}}$ $=Q$;

$= \mathfrak{Q}$; and the probability of all the arguments for the fact will be $P - \mathfrak{Q}$, if P be greater than $\mathfrak{Q}$; or againſt it $= \mathfrak{Q} - P$, if $\mathfrak{Q}$ be greater than P.

The ſum of all the independent arguments for and againſt an event's happening cannot exceed certainty (1).

11. If the denominator or number of poſſible ways (a) be infinite, and the numerators or chances of the event's happening p, q, r, s, &c. be finite; the chance of a ſucceſſive event's happening will be infinitely ſmall, though it has ſucceeded any finite number of times: the ſucceſs of it nearly proves it to happen from a fixt and determined law: from univerſal experience every event clearly happens from a fixt law, though we may be ignorant of the continuation of it.

12. Let the probability of the events A, B, C, &c. happening in any one trial be reſpectively a, b, c, &c. and certainty E; then the probability of the events A, B, C, &c. happening reſpectively b, k, l, &c. times in n trials may be expreſt by a fraction, of which the numerator is

$$\frac{n}{1} \cdot \frac{n-1}{2} \cdot \frac{n-2}{3} \cdot \cdot \cdot \frac{n-b+1}{b} \times \frac{n-b}{1} \cdot \frac{n-b-1}{2} \cdot \frac{n-b-2}{3} \cdot \cdot \cdot \frac{n-b-k+1}{k} \times \frac{n-b-k}{1} \cdot \frac{n-b-k-1}{2} \cdot \cdot \cdot \frac{n-b}{}$$

$\frac{n-b-k-l+1}{l} \times$ &c. $\times a^b \times b^k \times c^l \times$ &c. and denominator E^n.

Cor. If all the events poſſible in the trials are included in A, B, C, &c.; then $E = a+b+c+$ &c.

13. Let the probabilities of the events A, B, C, &c. happening in each trial be, as before, a, b, c, &c. and certainty E; and the probability of the events G, H, I, &c. happening in each trial in another caſe be a', b', c', &c. and certainty F; then will the probability of the events A, B, C, &c. happening b, k, l, &c. times in n trials, and the events G, H, I, &c. happening b', k', l', &c. times reſpectively in m trials be a fraction, of which the numerator is $n \cdot \frac{n-1}{2} \cdot\cdot \frac{n-b+1}{b} \times \frac{n-b}{1} \cdot \frac{n-b-1}{2} \cdot\cdot \frac{n-b-k+1}{k} \times \frac{n-b-k}{1} \cdot \frac{n-b-k-1}{2} \cdot\cdot \frac{n-b-k-l+1}{l} \times$ &c. $\times m \cdot \frac{m-1}{2} \cdot\cdot \frac{m-b'+1}{b'} \times \frac{m-b'}{1} \cdot \frac{m-b'-1}{2} \cdot\cdot \frac{m-b'-k'+1}{k'} \times \frac{m-b'-k'}{1} \cdot \frac{m-b'-k'-1}{2} \cdot\cdot \frac{m-b'-k'-l'+1}{l'} \times$ &c. $\times a^b b^k c^l \times$ &c. $\times a'^{b'} b'^{k'} c'^{l'} \times$ &c. and denominator $E^n \times F^m$.

Cor. 1. If all the poſſible events of the trials are

are included in the events A, B, C, &c.; and G, H, I, &c. reſpectively; then will $E = a+b+c+$&c. as before, and $F = a'+b'+c'+$&c.

The ſame principle may be applied to any number of caſes of a ſimilar kind.

14. 1. Hence by addition may be adduced the aggregates of any ſimilar quantities to any number of different values of b, k, l, &c.; b', k', l', &c.; e. g. When $b = \frac{1}{2}n$, $\frac{2}{3}n$, &c., or greater or leſs than $\frac{1}{2}n$, &c. by given quantities; or like aggregates, when the above mentioned quantities b, k, l, &c.; b', k', &c.; &c. are greater or leſs than or in any given proportions or relations to each other.

15. From all but one of the above mentioned independent quantities being given in each of the equations, can be deduced that one; which may be done from the rule of falſe, when near approximate values of the unknown quantities required are known; i. e. values much more near to one or two, &c. roots or values of the unknown quantities, than to any other; in the firſt caſe a ſtill more near approximate may be found from the reſolution of a ſimple equation; in the ſecond from the reſolution of a quadratic; &c. or if the values of all the correſpondent quantities are known in a caſe where the quantities differ very little from the quantities in the given equations, ſimilar principles may be

be applied for the inveſtigation of more near approximations.

16. Theſe principles may be applied to the inveſtigation of the probability of the truth of the deciſion by any number of voters, and many other caſes; a, b, c, &c. denoting the probability of any voter voting truly, ſuſpending his vote, or voting contrary to truth: and ſimilarly of more deciſions, &c.: but it is impoſſible to determine the knowledge, integrity, and various influences which actuate each perſon, and conſequently to determine the probability of their voting truly, &c.

17. Similar propoſitions may be deduced, when in every trial any of the quantities a, b, c, &c. is diminiſhed by x, from the theorem $(a+b) \cdot (a+b-x) \times (a+b-2x) \ldots (a+b-(n-1))x = a^n + na^{n-1}b + n \cdot \frac{n-1}{2} a^{n-2} \cdot b \cdot (b-x) +$ &c. given by me in the Philoſophical Tranſactions and in a pamphlet publiſhed at Cambridge on Tranſlation of Algebraical Quantities into probable Relations, &c.

The belief of the fact ought rationally to be proportional to the probability when found; what has been given in the preceding articles may be applied to the ſubſequent concerning teſtimony.

18. Since we know nothing concerning the ultimate

ultimate cauſes of events or appearances, every thing may be ſuppoſed to have varied an infinite number of ways without any abſurdity or contradiction from human reaſoning, to none of which can human underſtanding give a preference from any argument but utility, and moſt commonly not even from that: if the number is infinite, the probability of their happening in any one is infinitely ſmall; e. g. The ſun, the earth, the planets, comets, ſtars, &c. might be ſuppoſed to have moved in an infinite number of directions; they might have been ſituated in as many different poſitions; their diameters, figures, denſities, forces, &c. might have varied infinitely without any proof to the contrary being deducible from human underſtanding, and the ſame may be affirmed truly of moſt things in the conſtitution of the world: every thing has its laws affixed by the Creator.

19. Probability or chance is the offspring or creature of imperfect knowledge; or, which is the ſame, partial ignorance: every thing is created certain in itſelf; to perfect knowledge therefore every thing is certain: on the other hand, total ignorance affords not the leaſt appearance or knowledge of the ſubject or its probability.

By chance or probability I mean its extenſion from certainty to impoſſibility.

20. To beings ſituated in an imperfect ſtate, probability, or more properly confidence in the future from the paſt, is the foundation of nearly all their knowledge, imperfect in itſelf, and a rule for their actions; e. g. The farmer cultivates his land and ſows his corn, on the probability that he ſhall reap; man carefully provides what is neceſſary for his future well-being, on a ſuppoſition or probability that he ſhall live to enjoy it; and he ſhould take ſuperior care to ſecure for himſelf happineſs in a future ſtate, on a certainty of death and firm aſſurance of eternal life. The leſs is the degree of probability or confidence of their knowledge, the more on that account imperfect their nature. In human nature probability, or human knowledge, is built on paſt experience; we know not the conſtitution of things, and conſequently cannot from it deduce the accidents. The ſame is true in the whole ſyſtem of living beings contained in this world.

The *Supreme* has impreſt on our minds a faculty for the ſource of all our knowledge and actions; namely, a neceſſary or impulſive belief of the future from the paſt, viz. that what has been for the time paſt of our lives joined together or conſtantly ſucceeded each other, will for the future be joined together or be found in the ſame order to ſucceed each other. It will readily,

readily, I ſuppoſe, be allowed, that this is not deducible from reaſon, or any other preceding principle, by the generality of mankind; they know no principle but experience, from which they can argue from the paſt to the future, and never pretend to aſſign the degree of its probability.

If mathematicians could, from an event's having happened *n* times, deduce the probability of its happening *m* future times, they would proceed one ſtep beyond the reſt of mankind; and demonſtrate that to be founded to them on reaſon or a more diſtant, which to the generality of mankind is founded on immediate experience only.

PRINCIPLES AND RULES OF HUMAN REASONING.

The ſame mechanical cauſe always produces, accompanies or precedes the ſame effect: this is manifeſt from univerſal experience; which proves the veracity of the Creator, in whom is no deception, for truth equally appears from deeds as words. Certainty in this renders certain all the works of the creation: on this all our reaſoning depends.

Univerſal experience proclaims every effect to have a cauſe.

1. If the event *A* always ſucceeds the event

B, then the prior event *B* will generally in human reaſoning be deemed the cauſe of *A*.

2. If the event *A* always accompanies the event *B*, then the events *A* and *B* are deemed to have the ſame cauſe, whether known or unknown; or cauſes which neceſſarily accompany each other.

e. 1. If the body *a* ſtriking *b* always loſes a certain quantity of motion at the ſame time that *b* gains it; then the loſs of motion by *a* and gain by *b* are deemed to have the ſame cauſe, viz. the action of the bodies on each other; though the loſs of *a* may be ſaid to be occaſioned by the reaction of *b*, and the gain of *b* by the action of *a*, which neceſſarily accompany each other.

e. 2. If ſome properties of material bodies always accompany each other in time and place, we conclude them to have the ſame cauſe; though we may be entirely ignorant of the ſubſtratum, ſupport or cauſe.

3. No cauſes or effects, i. e. preceding or ſubſequent effects can be concluded, but what are deducible from or correſpondent to paſt experience of ſimilar cauſes and effects.

4. If ſome events have regularly ſucceeded each other in any order, in the ſame do we expect ſimilar events always to ſucceed; and the more often we have obſerved theſe events regularly to ſucceed or accompany each other without

out failure, the greater we believe to be the probability of their continuance in that order.

What is aſſerted in all theſe caſes concerning events, may equally be applied to the compoſition and reſolution of bodies and events; for thoſe compoſitions and reſolutions may be conſidered as events.

5. The more the events are which accompany or ſucceed each other in one caſe, and ſimilarly accompany or ſucceed each other in another; the greater, cæteris paribus, to us is the probability that any other events which accompany or ſucceed each other in the former caſe, will likewiſe accompany or ſucceed each other in the latter: e. g. The greater the number of properties of two bodies are which agree, i. e. are ſimilar to each other; the greater, cæteris paribus, is the probability that the remaining, and, à fortiori, ſome of the remaining properties are correſpondent, i. e. ſimilar to each other.

6. If any events ſometimes accompany each other and ſometimes do not, and it is not known on what depends the contingency or failure; the probability is generally eſtimated from the proportion of the number of times they have accompanied or ſucceeded each other in the ſame order, to the number of times they have failed: the greater the number of trials, the more probable is the juſtneſs of the proportion.

7. If

7. If ſome events accompany or ſucceed each other, we conclude it probable that events nearly ſimilar to the preceding will accompany or ſucceed each other in the ſame order nearly, unleſs ſomething is known to the contrary; the more widely different the preceding are from the ſubſequent, the leſs the degree of probability, and the leſs the ſimilarity: on the contrary, if the preceding events do not generally accompany nor ſucceed each other, it creates, as before, a probability that events nearly ſimilar will neither generally accompany nor ſucceed each other.

8. If the contingency of an event depends on the contingencies of ſeveral whoſe probabilities are given, from the preceding principles its probability may be deduced.

9. Since we always find ſimilar cauſes to produce or precede ſimilar effects, we are induced to reverſe the propoſition, and conclude from ſimilar effects to ſimilar cauſes: all ſimilar cauſes produce ſimilar effects, as follows from univerſal experience or truth, we can therefore conclude from cauſes or precedent events when well known to ſubſequent; but on the reverſe, the ſame effect may proceed from different cauſes or compoſitions of cauſes; e. g. The ſame may be the weight, the colour, &c. of different bodies; we cannot therefore conclude from natural effects of the ſame kind to ſimilar cauſes, unleſs

ſo

ſo many effects are included as to preclude all bodies of a different kind: if the concomitant effects are ſome ſimilar and ſome diſſimilar, we commonly conclude the cauſes to differ.

10. If the properties of two bodies, which do not depend on their different organization of parts, are ſome ſimilar and ſome diſſimilar; then we ſhall be induced to conclude, that their ſubſtances or ſubſtrata differ.

All material bodies are endued with gravity or weight, vis inertiæ, &c., which never appear to vary differently by any organization; i. e. different diſpoſition of parts that can be made by us; and conſequently, when we argue from theſe properties alone, we conclude the ſubſtrata to be ſimilar; but when we conſider that the bodies are endued with properties entirely different from each other, as to colour, taſte, ſmell, hardneſs, &c. we begin to doubt; whether the ſubſtrata are different, or whether the properties, which are different do not depend on the different diſpoſition of parts; and it is an additional force to this latter opinion, that we find theſe laſt mentioned properties to vary by changing their diſpoſition of parts: if we find every property that does not appear to vary with changing their organization of parts to be ſimilar in different bodies; we from thence conclude the ſubſtrata of thoſe bodies to be ſimilar;

unleſs

unleſs in a ſimilar organization of parts, which can never for certainty be known, and ſimilar poſitions and circumſtances they ſhould appear different to a being endowed with ſimilar percipient powers; for in this caſe we ſhould think the ſubſtrata to differ: this reaſoning only concludes the cauſes to be different, when the effects in the ſame circumſtances differ.

11. If one ſubſtance is endued with ſenſation, perceptivity, underſtanding and freedom of will, and another not; their properties being very diſſimilar, mankind have diſtinguiſhed them into two kinds of ſubſtances, immaterial and material: by material, they underſtand ſubſtances not endued with perceptivity, and conſequently always acting neceſſarily and not voluntarily; for no action can be voluntary without perception and underſtanding.

By organization of parts, I mean with the vulgar, diſpoſition of parts; and by organized matter, I underſtand meer matter in a certain diſpoſition of parts; if any thing elſe be meant by organized matter, then organized matter cannot be ſaid to be of the ſame ſubſtance as meer matter.

12. Many writers have defended the materiality of the ſoul; but we muſt from its properties, underſtanding, freedom of will, &c. being different from the properties of meer matter, conclude the

ſub-

ſubſtratum of the ſoul to be different from that of meer matter, till we can ſo organize, or differently diſpoſe the parts of meer matter, that it ſhall contain underſtanding, will, &c.

The arguments which I remember to have read in ſupport of it are

1. The ſoul is immaterial, and conſequently immortal: the ſoul's immateriality, no more than its materiality, proves its immortality; it cannot be deduced from the nature of the ſubſtrata themſelves, of which we are entirely ignorant; nor can it be demonſtrated from any properties of matter or ſpirit that we know: does preſent perception, underſtanding and will, imply their eternity, i. e. their immortality, any more than meer mechanical powers? certainly not. All the properties of either can be deduced only from experience, and from no one property can we derive another, unleſs it is included in it; they entirely depend on the Almighty fiat.

2. The ſoul is material, as it receives impreſſions from matter.

By no reaſoning whatever can we deduce the poſſibility or impoſſibility of the action of one material ſubſtance on another, and as little of material or immaterial ſubſtances on each other, they can only be diſcovered by us from experience; and experience teaches that all things known to us, however widely different in their

properties and nature, do mutually act on each other, whether material or other ſubſtances.

We know not what common properties any material and immaterial ſubſtances may have, they may be endued with many; and a future ſtate may diſcover to us many common and other properties, of which we at preſent have no conception, notwithſtanding any thing that can be aſſerted to the contrary; indeed we know (comparatively ſpeaking) very few of the properties of either; but it can never be concluded from human reaſon, that ſubſtances which have no common property muſt be incapable of all mutual action: is any contradiction or abſurdity implied in the term? The Almighty has no common property with material ſubſtances; is he therefore incapable of acting on them?

3. If the ſoul was immaterial, there would be no occaſion for material organs to convey to it any information. If there were not different kinds of immaterial ſubſtances, i. e. ſubſtances not material; and conſequently our ſoul was endued with all the ſame properties, and of the ſame ſubſtance as the *Supreme*, then the argument would be concluſive; for the Almighty needs no material organs: but if there are different kinds of immaterial ſubſtances, no one can ſay what other immaterial ſubſtances may have occaſion for: I believe that there is occaſion

for

for whatever is; and particularly in this caſe, as I ſee the material organs produce the moſt uſeful and admirable effects, being the grounds of all our knowledge and ſupport in this ſtate; in another ſtate theſe organs may be changed.

I know no proof, that there are not different kinds of material ſubſtances, and that all material ſubſtances have the ſame properties, and their difference only depends on their different diſpoſition of parts: no one has yet diſcovered the philoſopher's ſtone, or art; by which he can change, by differently diſpoſing the parts, every ſpecies of matter, into gold, or any other ſubſtance: the ſame may be advanced concerning immaterial ſubſtances; the Almighty fiat is the only general ſpecific of this ſort.

4. Neither age, nor experience, nor the growth of a body, can make an immaterial perſon more rational.

Of this, as other matters, we can only reaſon from experience: the properties of meer matter; the action of one material ſubſtance on another in the ſame circumſtances, will, as appears from experience, be the ſame at all times; the infinite properties of the Supreme, his *knowledge*, his *wiſdom*, his *power*, his *goodneſs*, &c. never increaſe nor diminiſh; but the properties of inferior ſpirits or inferior immaterial bodies vary, improve, increaſe, diminiſh, &c.; the under-

ſtanding in all its branches, the will, the ſtrength of the action of the ſoul on the body as in part appears from ſelf-motion; and the vivacity of ideas excited by the action of the body on the ſoul, &c. vary. Attention and experience certainly increaſe and improve our knowledge; and by them and the habit of body, the faculties of the ſoul are rendered ſtronger or weaker: by experience and obſervation, principally ariſing from the ſoul, its knowledge and faculties are moſt increaſed; and by the habit of body the loco-motive powers of it: from experience it rather appears, that the mind is more capable of being improved while the body is in a young and tender ſtate, than when it is in a more adult; unleſs the mind has been improved before by exerciſe. Will any one undertake to prove, that the properties of matter improve, and the faculties of the mind always continue the ſame, contrary to univerſal experience. After death, when the body is no longer acted on by the living principle or ſoul, it is ſo far from being improved, that it is endued with no other principles than meer matter; and incapable, by any art known to mankind, of having any living principle given to it.

5. Perception, underſtanding, and will, &c. i. e. the living powers ſeem always to be ſituated in and are never found, except accompanying

nying a certain ſtate of the brain, and conſequently inhere in and belong to the brain; concomitancy is a proof of one being contained in the other.

2. In a ſwoon, or apparent drowning, we cannot reaſonably ſuppoſe the ſoul to leave the body and return: in ſleep the mind either imperfectly thinks, or not at all, probably owing to the powers of life ſtill in the body.

Senſation and ſelf-motion, in a more perfect ſtate, often accompany a more healthful ſtate of the body and its parts; but when ſome of them are injured to a conſiderable degree, the functions of the mind ſuffer alſo: all the parts of the body may be injured to a ſmall degree, as appears to me, without any ſenſible injury of the faculties of the ſoul; but, when ſome of them, as the circulation of the blood and juices, the heart, the brain, &c. are deſtroyed or injured to a great degree; then perception, thought, &c. are no longer found or contained within the body.

1. If concomitancy in time alone is a proof of thought being contained in whatever accompanies it, then does thought inhere in and belong to the blood, the juices, the heart, the brain, &c.; from ſuch concomitancy, what reaſon have we to give a preference to one of theſe more than another? all the works of the creation,

tion, that begin and end together, may, from a parity of reaſoning, be ſaid to inhere in and belong to each other.

2. But if by concomitancy is meant concomitancy in time and place: from our ſenſations it appears, that perception, underſtanding, will, &c. exiſt together ſomewhere within the brain; either in ſome part of it, or in ſome place contained between two or more different parts: let any one mention the part of the brain, in which the ſoul exiſts, or which is the ſoul; but if no one can, then no concomitancy in place can be proved: but if it exiſts in any part of the brain, for reaſoning, let it be the pineal gland; and if in the pineal gland, in what particle does it exiſt? for the particles ſeem very little to differ from each other, unleſs in ſituation; and in ſituation as little as poſſible from the next adjacent ones; and conſequently the ſoul on this hypotheſis from the body: can any one think that the motion of the blood or any juices (which is a ſine quâ non) acting on a particle of the pineal gland, &c. can give it underſtanding, will, or active powers? for active powers muſt originate from the ſubſtance itſelf, and are not ſubject to any mechanical or neceſſary powers. After death no one will think it deducible from reaſon or experience, that by the motion of blood or any fluid, or

meer

meer matter whatever, perception or underſtanding, &c. can be given to any part of the pineal gland; and if no ſuch perception, &c. can be given from the ſame motions or actions after death, it ſeems probable, that from them none can be given before death: but if it be affirmed, that every part of the pineal or other gland has ſenſation, perception, &c. and that the perception reſults from the perception of ſeveral parts; can the ſeveral parts, ſituated in different places, have perception in their reſpective places, without perceiving, i. e. having any perception in them? is it not a contradiction in terms? but if on the contrary it be ſaid, that the whole perceives, without perception being contained in any part; this ſeems contrary to univerſal experience, and requires a proof, and alſo repugnant to every known property of matter; for the properties of matter reſult from the action of every individual part conjoined, if that may be called action which implies neceſſity, as the gravity or weight of the whole body reſults from the weight of each of its parts conjoined.

Freedom of will can ariſe from no mechaniſm, for univerſal experience teſtifies, that meer matter and any organization or diſpoſition of its parts is neceſſary, not voluntary, in all its properties; the ſame may be aſſerted of all the particles of matter contained in the body after death,

death, or ſeparation of ſoul and body; and of all the particles of matter, which are conſtantly ſuperadded to every part of the body, and conſtitute great part, if not the whole of the body during life. The mind produces ſelf-motion of the body and all the inveſtigation of truth, not from any organization of the parts, for no particle of matter can give motion to itſelf; but from the ſoul.

The mind is fatigued, wearied, &c.; but matter never. In ſleep the circulation, &c. are carried on in a perfect ſtate, but they do not produce ſenſation, &c.; if ſenſation, &c. ariſes from meer mechaniſm acting conformable to our experience, the ſame cauſe would always produce the ſame effect; i. e. when the motions, &c. of the body are the ſame, the ſenſations, &c. of the mind would be the ſame; and likewiſe every action of any external object, by means of the body, on the mind, would equally and conſtantly produce a ſenſation or perception, which is contrary to conſtant experience.

The body and mind may be conſidered as a machine, which conſiſts of a number of different parts; the effect may be produced in or by the ultimate, in this caſe the mind; if in the machine ſome of the inferior parts are injured, the effects will probably be injured; but if the ſame be deſtroyed, the effects will probably ceaſe;

ceaſe; all theſe inferior parts may be deſtroyed without the ultimate being injured; and by the addition of another body or inferior parts, perhaps of ſuperior mechaniſm to the parts deſtroyed, ſuperior effects may be produced: this may be analogous to the body and ſoul, for after the deſtruction of the preſent body, a ſuperior may be added, and the powers of the ſoul or mind may be increaſed; the body probably ſubjoined will be of different materials, form and conſtruction or organization from the preſent body; for the parts formed for generation, and the breaſts for the nutrition of the infant, the preſent material ſyſtem of nutrition and circulation of the blood and juices; and the ſecretion of the glands, which will probably render the body by ſmall obſtructions occaſioned by any errors or irregularities in diet, &c. liable to diſorders, and produce the deſtruction of the machine; and even our hands and feet, and the whole muſcular ſyſtem, may not be neceſſary, and conſequently the whole organization of the parts may be changed; and further, even the ſubſtance or matter, of which the body is compoſed, ſo liable to corruption, may be aboliſhed or changed, it may have no power of gravitation, &c.; but to change the eſſential properties of a ſubſtance, according to human underſtanding, is to create a new one: this corruption

muſt put on incorruption, this mortal muſt put on immortality; it is ſown a natural body, it is raiſed a ſpiritual one.

Our Saviour's body never ſaw corruption, it probably roſe the ſame as laid in the grave, and continued ſo as long as was neceſſary for the conviction of his diſciples; but no doubt it was or will afterwards be changed into the moſt glorious, and probably not of the ſame conſtruction as the former human body.

Concomitancy in a complicated machine proves only that the ſeveral concomitant parts are uſeful, or probably contribute to produce ſome effects of the machine; and not that the effects of the machine are contained in or produced by any individual part of the machine but the ultimate, which in the human body is the ſoul, exiſting ſomewhere within the brain; but can never be proved to be contained in any part of it; and if it could, it would not be a demonſtrative argument that the ſoul is that part of the brain.

I ſhall recapitulate what has been ſaid on this ſubject. We know nothing of the ſubſtrata or ſubſtances of bodies; we only know from experience their faculties and properties; when theſe are different and cannot by any different diſpoſition of parts be rendered ſimilar, we naturally conclude their ſubſtrata different; perhaps

haps the only concluſive proof known to us of the ſimilarity of ſubſtances, is to prove their properties ſimilar; if ſpirit or ſubſtance endued with perception be meer matter, the beſt proof would be ſo to diſpoſe and organize meer matter, that it may acquire ſenſations, perceive and think, &c.; if a diſtinction is to be made between meer matter, which does not depend on their organization, i. e. different diſpoſition of parts and organized matter, then meer matter cannot from human underſtanding be demonſtrated to be organized matter: if all ſubſtances, which are not endued with perception, thought, ſelf-motion, &c. be called material, then ſubſtances endued with perception, &c. may be called immaterial, i. e. not material, unleſs the former can be ſo diſpoſed by us as to produce perception, thought, &c.: if the Supreme ſhould give to any material ſubſtance the living powers, i. e. underſtanding, will, and ſelf-motion, we ſhould not, in our preſent ſtate, know it to be a material ſubſtance, unleſs revealed to us. All the properties of matter, &c. are entirely paſſive, and conſequently all their accidents in regard to themſelves neceſſary; were it otherwiſe, matter muſt be an underſtanding ſubſtance, and endued with will, for no deeds can be ſaid to be really actions, but what are voluntary: ſome of the powers of the mind are active and voluntary:

is it agreeable to experience, that things entirely paſſive, by any compoſition can become active? things without perception, underſtanding and will, and ſelf-motion, can totally change their nature, become ſuperior, and acquire the beforementioned faculties? No one can tell what latent faculties, given by the Supreme, may be contained in any ſubſtance; but the abovementioned ſeem oppoſite to all the known properties of matter, and contrary to univerſal experience, from which only we can reaſon.

From what has been ſaid, it appears that the principal properties of matter and ſpirit known to us are widely different, and conſequently no reaſoning from them can ever prove their ſubſtances to be the ſame, but to our underſtanding muſt argue the contrary.

Concomitancy in time has been ſhewn to be no proof of identity of ſubſtances; and concomitancy in place of the ſoul and any part of the body can never be proved; and if it could, it would be no proof of its being that part, as ſome immaterial and material bodies may poſſibly be in the ſame place at the ſame time; though from experience it ſeems probable that two different material bodies, ſuch as we are converſant with, cannot.

Concomitancy in the action of a machine does not prove the ſameneſs of the parts, it does not

not prove the inferior parts to be the ultimate, and conſequently the body to be the ſoul: when the lower parts are injured, the effect produced by the ultimate may ſuffer; all the parts of the human body are liable to ſome injuries; if the parts are not very greatly damaged, the faculties of the mind may not be injured in the leaſt, and ſometimes a ſlight injury of the body may be the cauſe of their improvement. The mind, as in ſleep, often loſes thought and will, or remits their intenſity, though the ſtate of the body in all appearance to us remains the ſame; if the mind depended entirely on the body, would not there always be a concomitancy? which indeed is moſt commonly not the caſe. In the ſame ſtate of the body and external objects, would not the ideas in the mind be always the ſame, if they were owing to mechaniſm? does the underſtanding, &c. depend on the ſtate of the body? the beſt underſtanding, &c. ſeldom accompanies the ſtrongeſt or any one ſtate of body. Our knowledge, and even the improvement of our faculties, depend principally on the cultivation of the mind, by application and attention; the properties of matter never improve or alter, the ſame circumſtances being ſuppoſed: different minds are grieved with different affairs, not dependent on any neceſſity, but originating from the mind itſelf; and when they are much grieved, the body will

will be injured by it, even as the mind ſuffers by the body being injured. All the parts of the body are conſtantly receiving additions of particles of meer matter and loſing others; if ideas, thoughts, &c. were eſſentially contained in thoſe parts, it would be probable that every perception would remain of the parts retained and be eradicated of the parts loſt; and if it depended on both together, there muſt be a change in the ideas, thoughts, &c. from the parts being added and loſt; the parts added and loſt conſtitute almoſt the whole of every part of the body; the particles of matter never weary, nor their actions ceaſe, and conſequently no compoſition of them: but I have been already too long on this ſubject; what the ſubſtrata either of matter or ſpirit are, or whether they are different or the ſame, muſt ever be unknown, and does not at all concern us; the ſomething called Myſelf, whatever it may be, is of the ſame conſequence; and its ſenſations, its happineſs and miſery, would probably be little affected by my being acquainted with its nature; and from it I could never argue concerning my exiſtence in a future ſtate: this moſt probably depends not on the ſubſtratum, but on the Almighty fiat, and his will can only be deduced from our moral not our natural faculties.

13. Whether our ideas are mediately produced in the mind by the action of external objects, or imme-

immediately by the Almighty fiat without the means of external objects, can never be demonſtrated by the human underſtanding.

The following are ſome of the arguments, which have been adduced for the rejection of external objects.

1. We have no idea of ſuch a ſubſtance: this argument would equally prove, that there is no ſubſtance or exiſtence of any thing in nature but ideas, without any being or ſubſtance for them to exiſt in: a propoſition contrary to common ſenſe.

2. It may be granted, that nothing is like an idea but an idea, but we cannot thence conclude, by reaſon or experience, that nothing exiſts but ideas; on the contrary, general experience teaches us, that every thing, and conſequently every idea, has a cauſe which produces it, and that the ſeveral ideas, which accompany each other in the ſame time and place, are derived from the ſame cauſe, or the ſame ſubſtratum: if from repeated obſervations we find the ſubſtance to be endued with perceptivity and ſelf-motion, we denominate it a living being; if we perceive it to be endued with perceptivity, and to draw rational concluſions from ſeveral ſelf-evident propoſitions immediately deducible from experience, we denominate it a rational being; if we perceive it to inveſtigate and have a ſenſe of the

the laws given by the Supreme for a rule of its actions, we call it a moral agent: and we generally conclude, that theſe living and rational beings have ſome ſubſtrata, in which their ſeveral attributes are contained: but does it not appear equally reaſonable; or may not we reaſon from the analogy of all things, that what are termed material bodies, which always produce in our minds certain collections of ideas, and ſeem endued with properties for that end; for the ſupport of our bodies; and improvement of our minds; and exerciſe of our moral faculties, by affording us the means of doing good to our fellow creatures and preſervation of ourſelves; and probably many other accounts; have equally ſubſtrata in which thoſe properties exiſt?

3. Another argument is, that no ſubſtance can give another any property that it has not itſelf, and conſequently no ſubſtance that is not poſſeſt of ideas can produce ideas in other ſubſtances, nor give any ideas which it has not itſelf: we may from the ſame argument conclude, that it is impoſſible for any body not endued with perception to exiſt; for by this reaſoning, it can never be perceived by the Supreme or any other being: but this is evidently abſurd; no doubt the Supreme can create ſubſtances not endued with perception, that can produce ideas in our minds; and the queſtion is not what he can do, but what he has done. He

He has given one ſubſtance, viz. Man the power of producing ideas in another conſentient to his own by the uſe of language, &c. he has further given him the power of producing ideas in others, which are not always contained in the mind of the producer at the ſame time; e. g. he has given to ſome the power of producing the ideas of pain, imperfection, &c. in others, from which they are exempt at that time; and on the other hand to inferior animals or ſubſtances a law by which they produce in ſuperior ones ideas of which probably they are not poſſeſt. Perſons reviewing the table before them, on which they write, believe, that the ſomething, which gives them the idea, is not poſſeſt of it itſelf: experience therefore teſtifies, the ſupreme has not eſtabliſhed a general law that nothing ſhall give or produce in any other ſubſtance or being, what it has not in itſelf; but the contrary appears through the whole conſtitution of nature.

4. It has further been argued, that ſuch intervening objects would be of no uſe, as the almighty fiat could equally produce the effect without them, as by their aſſiſtance: to this it may be anſwered, that by this reaſoning no ſubſtance whatever material or immaterial is of uſe, for the almighty could equally have produced every effect without as with their aſſiſt-

ance: but it is too arrogant for human reaſon to aſſert, that any thing can be of no uſe, we know not all, perhaps very few of the uſes, to which the bodies with which we are moſt acquainted even ourſelves, much leſs ſubſtances of which we have no ideas, can be applied; an argument againſt the exiſtence of things, becauſe we are unacquainted with their uſes, muſt ever be eſteemed weak and preſumptuous for the abovementioned reaſons; we are not to argue concerning the beſt and propereſt modes of acting, for of that we cannot judge; but from experience to ſee the exiſtence of things, often ſome of their uſes; and of this be aſſured, that every thing exiſting has its uſe; and one of the uſes of theſe ſubſtances is the production of ideas, &c. in our minds. Does not the exiſtence of properties argue the exiſtence of bodies, ſubſtances or ſubſtratums in which thoſe properties exiſt? Has not the almighty given us a power of producing ideas in each other by means of intervening objects? Has he not made the air neceſſary for ſounds, and light for colours? or are there no bodies, no ſubſtrata, no worlds, no creation of the Almighty, in oppoſition to the general ſenſe of mankind, and conſequently appearing as a deceit on that general ſenſe? once more do ideas and properties exiſt without a ſubject or ſubſtratum

ſtratum to exiſt in, and is this deducible from or agreeable to the general and analogous experience and ſenſe of mankind? and further if we ſhould be allowed to reaſon from human nature, we ſhould eſteem it much more becoming the dignity of man to frame machines which ſhould anſwer the end propoſed by any other being, than conſtantly to attend and be obedient to the will of that being; this as to humanity: but as to the ſupreme I only argue from experience of what is done, which for reaſons though unknown to me, is certainly the beſt, and by a little experience is ever found uſeful; but I do not pretend that weak arrogant man can prove it the beſt, his abilities do not extend ſo far, he muſt look to what is done, lay his hand on his mouth and be dumb.

5. Our knowledge cannot extend further than our ideas, and as far as our knowledge extends every ſubſtance appears to us only as a collection of ideas: we are ignorant of the ſubſtratum or conſtitution of every ſubſtance, and conſequently can never deduce any properties beyond what experience teaches; nor can we from the properties ſo deduced extend our knowledge to the ſubſtratum, nor even one ſtep higher, nor one ſtep lower, and conſequently only to properties contained in thoſe deduced from experience; and ſince we know nothing of the ſubſtrata of bodies, we know

nothing of their identity, nor of the difference between the ſubſtratum of matter and ſpirit: of theſe the allwiſe or ſuperior beings can only have knowledge.

6. We can only know our own perſonal identity by conſciouſneſs; other perſons judge of it by the ſimilitude of appearance as to the body, parts of the body, voice, &c.; or in ſome caſes from the mentioning of different circumſtances, which they remember formerly to have occurred, and could be known only to ſome particular perſon.

7. The identity of vegetables and other ſubſtances is known by being found in the ſame or known place, and their ſimilarity at different times.

ON PROPOSITIONS.

Propoſitions are either independent, dependent or relative, or ſuppoſitive.

1. The probabilities of independent propoſitions are to be eſtimated from the laws of the probabilities of experience and teſtimony.

2. The probabilities of dependent and relative propoſitions are to be eſtimated from the ſame laws applied to the dependency or relation.

3. The probabilities of ſuppoſitive propoſitions are to be eſtimated from their poſſibility only, of which ſort are many mathematical propoſitions, which muſt generally contain as many

many different independent quantities as there are independent ſuppoſitions or hypotheſes.

4. If *A* has a given relation to *B*, then on the contrary *B* will have ſome relation to *A*.

5. In compound dependent or relative propoſitions we argue from the eſtabliſhment or rejection, truth or falſehood of ſome propoſitions to the eſtabliſhment or rejection, truth or falſehood of the other; and theſe are deducible from the ſame principles of experience and teſtimony.

6. One falſe ſtep in a demonſtration and all the remaining true will neceſſarily lead us into error:

7. One falſe ſtep may be reverſed by another, and from thence a true propoſition inferred; but commonly two or more falſe ſteps will lead us further from the truth.

8. In demonſtration we proceed carefully from one ſtep to another, from the ſecond to the third, and ſo on till we come from the firſt to the laſt, between which the relation is required.

9. In demonſtrative or which is the ſame, knowledge deducible from other by the reaſoning faculty; from no two propoſitions can a third be concluded, unleſs one of the propoſitions is, that one term is or is not contained in another.

10. If an attribute or property is aſſerted or denied in general of every individual thing contained

tained in a certain ſpecies, then it is aſſerted or denied of any particulars contained in that ſpecies.

11. If the ſame or part of the ſame thing *A* is predicated or denied of two different *B* and *C*; then ſomething, which is predicated or denied of one, is likewiſe predicated or denied of the other; for *A* is predicated or denied of both.

12. When all or ſome of one ſpecies have ſuch a property and all of another not; then all or ſome of the former ſpecies cannot be of the latter.

In theſe three laſt articles are contained all the categorical ſyllogiſms.

13. If *A* is included in *B* and *B* in *C*, &c. then *A* is included in *C*, &c.

14. An even number of negative propoſitions following each other gives an affirmative concluſion, and an odd number a negative.

15. Propoſitions which reciprocate as equalities in mathematics are joined by ſimilar copulæ: negative propoſitions always reciprocate when the terms are taken in general—in the reciprocal propoſition the predicate ſhould be made as particular as the ſubject in the original propoſition.

A is ſaid to be ſimilarly predicated of *B* as *C* is of *D*, when *A* is joined by the ſame copulæ to *B*, as *C* is to *D*.

ON TESTIMONY.

1. The probability of any relation of facts depends on the probability of the fact and credibility of the relators, but varies not as the product of the one multiplied into the other; for this would render a fact related by truth and knowledge itſelf to be very improbable: the probability of ſuch a relation varies principally as the credibility of the relator; for if two credible perſons in London ſhould aſſert that they were eye witneſſes of a fact happening at Long Stanton at ſuch an hour of ſuch a day, though the chance of either of them not being at Long Stanton at that time, to the chance of his being there (before it is aſſerted) may be as ten thouſand to one, and the chance of the events not happening at that time and place to its happening in as great a ratio, yet we do not heſitate to believe it, unleſs we knew ſome reaſon, that would or did prevent the perſons from being there, or ſome præeſtabiſhed law or cuſtom or reaſon contradictory to the facts happening at that time.

2. Hence it follows that the improbability of a fact related in hiſtory or otherwiſe may be very great indeed before it is related; but, if related by perſons of whoſe competent knowledge and credibility we have little reaſon to doubt, the probability may be ſuch as to excite in us the greateſt confidence of its truth, e. g. If a perſon

ſon mentioned that in ſuch a family the mother, ſon, grandſon and great grandſon, each lived to 80 years of age; and if the relator was a perſon of whom we entertained a great opinion as to his knowledge and integrity, and he aſſured us that he had particularly examined into the truth of it, we ſhould not heſitate one moment to believe it. If writers of undoubted authority, knowledge and veracity, aſſured us that ſeven kings reigned 210 years, a thing much leſs incredible than the former, we ſhould not heſitate to believe it; the belief of this may be ſtrengthened or weakened by correſpondent facts, it may be ſtrengthened by the kings being elected of a proper age, ſo as moſt likely to live the longeſt, &c. In all theſe caſes we cannot argue from one man or ten men living to a certain age, to one or ten others living to the ſame, for it will moſt probably deceive us; but from a great number ſome probability may be collected—the ſame may be aſſerted concerning all variable facts. To invalidate the belief of ſuch facts, the propereſt method is to demonſtrate the incompetent knowledge and deficient integrity of the writer.

3. The improbability of theſe facts before they are atteſted, differs very little in degree from the improbability of a miracle; but a miracle being a particular interpoſition of providence, will never happen unleſs for the greateſt and beſt

beſt and moſt benevolent purpoſes, principally for inſtructing mankind in the means of acquiring eternal happineſs. This being neceſſary for people of all times will contain internal evidence, which will be conſiſtent with and confirmed by all other laws given by divine Providence either by nature or revelation.

4. If the relator be the *Supreme*, i. e. Truth itſelf, the fact is certain; on the contrary, if the propoſition be a contradictory one, it is aſſuredly falſe.

5. Many facts, of which no teſtimony or writing remains, ſufficiently prove themſelves: I ſhall only mention a matter, in which I had ſome concern: a perſon had the bite of a ſmall coppice and kept the fence adjacent to every ones ſhare of the timber growing on it; no teſtimony remained of the manner in which he and his anceſtors became poſſeſt of it: a diſpute aroſe concerning the property of the ſoil, but it may eaſily be ſettled from this obſervation, that no perſon whatever in his ſenſes would give another man leave to plant trees for ever in his ſoil; he might as well give him the ſoil itſelf: and as to his having the benefit of the bite and keeping the fence of the other parts which were judged nearly equivalent, it muſt be ſuppoſed that he had the one for the other; as no one would put himſelf to the ex-

pence and trouble of keeping another perſons property in which he is not concerned without receiving an equivalent; this is a common caſe in many coppices.

6. The credibility of a witneſs depends on his ſuppoſed knowledge of the fact and integrity: his integrity muſt be judged of by what is known of his character through life; it may be warped by intereſt, party, prejudice, paſſions, connection by blood, friendſhip, authority, habit, &c., and proper abatement to be made from the credibility on theſe conſiderations, and a proper addition for evidence given in contradiction to them; it may be rendered more firm by reward and honour being annexed, diſhonour and puniſhment to the failure of it, and a proportional ſubſtraction or addition to be made: his knowledge may be eſtimated from an examination, and known circumſtances, which either debilitate or corroborate his evidence: if a fact has been communicated from one to another, and ſo on; before it came to the witneſs; the greater the number, the leſs cæteris paribus is his knowledge to be depended on: particular modes of communication may ſtrengthen, and others weaken it.

7. The truth of written teſtimony, hiſtory, &c. depends as before on the credibility of the facts

facts and on the knowledge and veracity of the writers; which muſt be judged of from the writings of cotemporary perſons; and on the original manuſcripts being lodged in ſecure places, where they probably neither could nor would be corrupted by any alteration or interpolation: and alſo on the probability of the ſeveral editions extending to the preſent time being truly copied from the original and each other, which moſt commonly depends on the number of readers and the ſuppoſed importance of the ſubject; theſe may be collected from the writings and prevailing cuſtoms of the different times.

8. The internal evidence depends on the agreement of the ſeveral parts, and alſo their conſiſtency with our own reaſon and experience.

9. 1. From theſe premiſes it will follow, that the writings of the new Teſtament have much greater external evidence than any other of the ſame date.

Chriſtianity was firſt publiſhed to the world by our Saviour Jeſus Chriſt during the time of his divine miſſion for years going through the different towns and villages of the Jews, conſtantly preaching its doctrine and working miracles; he was always followed by his diſciples and commonly by great multitudes of people who were witneſſes to theſe miracles: chriſtianity is

a religion, which contradicted the tenets, and forbad the practice of many things in all the religions of the world; a religion, which muſt appear of the greateſt importance, as it propoſed the means of ſalvation to all mankind; and denounced miſery to all, who did not follow its precepts: it was not only afterwards promulgated by writings, which would be read in the cloſet by a few philoſophers; but was publiſhed with the greateſt zeal and activity through all the known parts of the world by thoſe who profeſſed themſelves eye witneſſes of all the facts they publiſhed, and worked miracles and ſuffered martyrdom in ſupport of the doctrines they taught; multitudes being living, who were witneſſes to ſeveral of them; and many on whom miracles had been wrought: this naturally excited every kind of oppoſition, cruelty, deprivation of property and life itſelf from the zealots; and different orders of men, who were gainers by the eſtabliſhed religions; hence aroſe diſputes and controverſies, ſo that chriſtianity has undergone more examinations, and many more writings have been publiſhed from the firſt inſtitution to this day on it, than on any other ſubject; and it has ſo far prevailed as in general to have aboliſhed the idolatry then prevalent and to have become the religion in all countries, where learning and reaſon are much culti-

cultivated: the books of the new Teſtament have a further additional evidence by having been conſtantly read at ſtated times in all churches and congregations of chriſtians; whereas books, which contain nothing material to the inſtruction and happineſs of mankind, are only read by the learned and deemed of little conſequence, whether true or falſe. The old manuſcripts of the new Teſtament have been kept in the churches and public libraries, where any perſon might at proper times read or conſult them, and all the different ſects appeal to them; manuſcripts kept in private ſtudies can never have the ſame authority, as they may be corrupted by the poſſeſſors, and from hence very probably ſome different readings of the new Teſtament have occured; the more ancient and the more publick the manuſcripts have been kept, the greater is their authority.

The oldeſt manuſcripts now exiſting extend nearly to the third or fourth century of the chriſtian æra; copies of the original or tranſlations into the latin or vernacular languages are in chriſtian countries in the hands of moſt perſons, who can read: fac ſimiles are made of ſome of the old manuſcripts, but they ſhould be made of thoſe of the greateſt credibility, and paſs through the accurate examination of ſeveral perſons of character to ſtamp the

the mark of authority on them: collations of all the old manuſcripts have been carefully inſtituted, which is the moſt ſecure method of preſerving the different readings.

Another proof of the correctneſs of the ſeveral copies now remaining is, in conſequence of the diſputes between chriſtian and heathen writers many paſſages from the ſcriptures were inſerted in their writings, and from the earlieſt ages the quotations of the fathers, the firſt chriſtian writers, are conformable to the preſent copies.

I have recapitulated the facts, and from them I conclude 1ſt. that no human method of publiſhing a doctrine could be deviſed ſuperior, more diffuſive, more ſubject to every examination and more ſatisfactory; no human means of acquiring knowledge and detecting impoſture could be greater than the abovementioned of ſeeing and converſing many years with the founder of chriſtianity and examining his works and doctrines; and 2dly. no greater proof of veracity and knowledge can be given, than the unanimous agreement of ſo many diſintereſted eye witneſſes working miracles and dying in the ſupport of the truth of their teſtimony: theſe facts of the diſciples of Chriſt are related by more nearly cotemporary writers, and never denied, than any other whatever; and likewiſe con-

confirmed by their being conſtantly delivered from that time to this in congregations aſſembled in many parts of the earth: 3dly. nor could any manuſcripts be guarded with more ſecurity than thoſe of the new Teſtament; they have been preſerved in the moſt publick places, and copies of them in the hands of the generality of chriſtians, who juſtly thinking them of the greateſt conſequence, would take care, that they ſhould not be much corrupted, and would ſcrutiniſe every alteration: add to theſe an argument in ſupport of chriſtianity, which can never be adduced in ſupport of any other fact or hiſtory having no relation to it; I mean the fulfilling of prophecies, which extends even to the preſent and future time; no other hiſtory or facts relative to it ever laid the leaſt claim to preceding prophecies, prophecies of facts very improbable in themſelves both as to time and place; and particularly ſo, when miraculous events are foretold, cannot be conſtrued leſs than miraculous.

Hence amazing the difference between the external evidence for the truth of the new Teſtament and every other hiſtory: 1ſt. If we may judge from hiſtories of our own times, ſeveral facts are related not perfectly conſonant to the account given of them at the time, when they happened; this may ariſe from different cauſes.

cauſes. 1. If the perſon writes the hiſtory of himſelf and friends, it is to be fear'd, that he will be biaſſed to repreſent them in too favourable a light: but if he was not a party concerned and writes from the relation of others; the firſt relators may and often will repreſent things in a partial view, being connected with a party or biaſſed by intereſt; or afraid of the power, influence and connections of others; or having only hearſay authority never perfect; or a diſtant memory very fallacious; and not perfectly underſtanding matters, may make them accord to his own conjecture or inclination; or from party be led to relate things ſomewhat different from the former repreſentation: when hiſtorians gueſs at the cauſes of things, the odds are generally againſt them; for caprice, humour, and many little accidents ſo intermix with all the actions of mankind, that at a conſiderable diſtance of time it is for the moſt part weak and vain to form conjectures of our own; hiſtorians of the preſent times muſt know more of the circumſtances attending than can ever after be recovered; hence the emendations of critics will generally be falſe, for a great multitude of things, of which they are entirely ignorant, militate againſt their conjectures; hence many cauſes of error, ſo that truth is commonly mixt with falſehood; nor is there

there often any cauſe of much importance to counteract them, for no miracles can be expected to be adduced in favour of truth ſo immaterial, no corporal puniſhment for falſehood, no ſufferings of death in ſupport of the truth of the relation: indeed ſeldom any body will be found, who thinks it of ſo much conſequence as either publickly to approve or contradict; little regard will ever be paid to the preſerving the old manuſcripts and carefully printing true copies of things of ſo little importance to the happineſs of mankind. The immenſe difference between the evidence of the goſpel and profane hiſtory indicates the direction of ſupreme wiſdom, promulgating its laws to mankind.

In regard to the internal evidence of ſacred ſtory; what can be more elèvated and juſt, than is given in it concerning the divine attributes, his power, his wiſdom, his goodneſs, his juſtice? What can be more animated, than the ſpirit of devotion, which pervades the whole; of thankfulneſs for mercies and bleſſings received, our creation, preſervation and all the bleſſings of this life, and above all for the pardon of our ſins and redemption from God's wrath by *Jeſus Chriſt?* Can any thing be more earneſt than the prayers and petitions for the grace of God in this life and eternal happineſs

in the next? What precept of morality can be more juſt and benevolent than to do to others as we would they ſhould do to us? Can humility, charity, purity of manners; can temperance and moderation be more impreſſed on the mind of man; or the reſpective duties between huſband and wife, parent and child, maſter and ſervant, and other relations be better and more decidedly ſtated?

2. On the other hand how ignorant and immoral is in general the mythology of the ancients? How far diſtant are the actions of their gods from power, wiſdom and goodneſs? How weak and perhaps ſinful for chriſtians to introduce ſeriouſly ſuch folly and probably impiety into their writings?

Their morality ignorant like their mythology before the coming of Chriſt ſometimes has an appearance of juſtice and temperance, and ſometimes permits the very worſt vices; generally wavers, and is never built on any ſolid foundation; ſo that chriſtianity exceeds paganiſm in its internal, perhaps even more than in its external evidence.

3. Hence it appears, that it is not in man to invalidate the truth of chriſtianity; nor ever can be till the end of time or a new revelation; and if a new revelation ſhould ever be delivered, it is ſcarce poſſible to believe that in after times

it

it ſhould have ſuperior evidence of its truth to the preſent: every rational perſon therefore will neceſſarily follow its precepts, not being able to invalidate the truth of it, and eſteem it a great argument in ſupport of its truth, that it is not poſſible to prove its falſehood; as he muſt believe that the *Supreme* would never ſuffer any falſehood of ſuch infinite importance univerſally to exiſt without affording means of its detection; and further if ſuch falſehood did exiſt, no one could juſtly be condemned for following it.

4. Before the promulgation of the goſpel of Chriſt; the tenets of philoſophers were built on a weak or rather no foundation, were often abſurd and immoral, and ſhewed their utter incapability of ever finding and proving the neceſſary obligation of moral laws; conſcious of it themſelves ſome became deſirous of a teacher ſent from God to ſhew them the way to ſalvation; and if the obligation of the moral laws could not be proved by them, how much leſs the remiſſion of ſins, the ſufferings of the Son of God a propitiation for them; things of the greateſt importance, but not to be diſcovered by the utmoſt ſtretch of human ſagacity? but let not the moraliſt of the preſent day triumph in his ſuperiority, for were the memory of chriſtianity entirely forgot all his boaſted

arguments would hardly be ſufficient to influence his own and much leſs the actions of all mankind.

5. No revealed religion except the Jewiſh and Chriſtian pretends to a proof from miracles and prophecy; but any truth, not deducible from human reaſon, requires ſuch proof for its ſupport; and conſequently no other revealed religion can be true, not having its neceſſary proof.

The miracles for the proof and atteſtation of the jewiſh law were performed in the ſight of the whole nation of the Jews, and of ſuch ſublimity, clearneſs and manifeſtation as not poſſibly to be miſtaken; had it been a deception the whole jewiſh nation muſt have joined in it for many years, and continued in it till this day.

The prophecies delivered in the jewiſh diſpenſation were fulfilled in the chriſtian, the continuation, completion and perfection of the jewiſh.

6. With ſuch evidence it has been aſked why did not the ſtateſmen and philoſophers embrace it; and why did it not become the univerſal religion?

To the firſt I anſwer, that if the ſame miracles were done in the preſent enlightened age. I am afraid that ſimilar effects would follow: the ſtateſmen ever afraid of innovation, which

ſeldom

ſeldom turns to their advantage, would uſe their endeavours to overthrow it; and the philoſophers, having embraced tenets of their own, would not readily ſubſcribe to others deſtroying their ſelf importance, their pride of fame and knowledge, and acknowledging the folly of all they had before learned and taught, and the ſuperiour excellence of the doctrine taught by fiſhermen; they would affect to deſpiſe and not examine; and if any did examine, it would be with a view to overturn it; perhaps a very few more candid than the reſt would embrace it; but time and truth would at length prevail, this may be the power of divine providence confounding the wiſdom of the world. In anſwer to the ſecond queſtion, why true religion and morality is not univerſally diffuſed; it is not in my power to judge of the diſpenſations of providence; I can only advance the fact, that true religion or any one religion is not univerſally diffuſed; this diſpenſation may reſult from the nature of things and ſtate of trial, in which we are now converſant.

ON MIRACLES.

The Supreme has preeſtabliſhed a ſyſtem or courſe of nature, that ſeveral events ſhall always accompany or ſucceed each other; which laws being learnt from experience, no doubt is ever

ever made of the continuance of them; and if they ever fail, when all the circumſtances are the ſame, it muſt be eſteemed a miracle; that is an alteration or change in the laws of nature ordered by divine providence for ſome particular utility in the ſyſtem, commonly a change in ſome particular inſtance of the natural ſyſtem for an atteſtation of truths in the moral, of the greateſt benefit to moral agents contained in the ſyſtem to know: in this caſe the circumſtances ſhould be accurately examined, in order to its being clear that they are all the ſame and no colluſion contained, i. e. they are apparently the ſame but not really; perhaps nothing can afford ſo ſtrong a proof to us as the performing ſome very uncommon event contrary to the laws of nature by a word or command only, of this all mankind can pretty equally judge; but if any thing mechanical be done, which requires ſkill and time to examine, we ſhall fear colluſion, it not being in the power of the generality to determine; the more ſimple and manifeſt the operation, the leſs ſhall we fear any.

The performance of a miracle argues the ſame power as creating ſomething out of nothing; for by a word to command ſomething contrary to the eſtabliſhed law of nature is to aboliſh the law already given, and to create a new

new one, i. e. to create ſomething out of nothing, which contributes to it.

The more impartial and proper the witneſſes, the greater ſupport do they give to their teſtimony of miracles; ſimplicity and even ignorance often afford evidence more to be relied on than cunning and even ſuperior knowledge.

Different miracles add ſupport to each other. A miracle will never be performed for proof of a falſehood or for no utility, it being contrary to divine wiſdom and goodneſs; but we muſt not arrogantly judge that a miracle is of no further uſe than we are ſenſible of; though we can argue no further than we know, yet it ſhould ever be without concluding that there are no other uſes, for we know not all the uſes of any one thing.

If we cannot doubt of the truth of a miracle performed by a being, for a proof of any doctrine delivered by him, we cannot doubt of the truth of that doctrine; for no being can perform any thing without permiſſion from the Supreme, and the God of truth would never grant ſuch permiſſion to prove falſehood.

Miracles and prophecies are not ſo neceſſary, if at all, in the preſent time, as before the delivery of the goſpel. It was neceſſary before for the conſolation of mankind, but the Meſſiah being come, and having ſuffered for the ſins of mankind, and given ſatisfactory proofs of his miſ-

ſion

ſion, and taught the means of ſalvation, all conſolation neceſſary is afforded us in the goſpel.

ON PROPHECY.

Miraculous prophecies muſt generally be delivered for the proof and ſupport of a religion given for the good and ſalvation of mankind; or in ſome particular caſes for the reformation of ſome perſons or people.

The credibility of a prophecy is to be diſtinguiſhed into four different periods; the time of the delivery of the prophecy, a time after the delivery and before the completion, at and after the completion of it.

The credibility in conjectural prophecy, i. e. conjecture at the time of its delivery depends on the probability of the thing propheſied; and in miraculous prophecy on the credibility of the propheſier.

Every thing foretold that will probably happen in the common courſe of nature conformable to paſt experience is a conjecture, e. g. that the ſun will riſe on the morrow; that a perſon will die in ſuch a time, which is according to the common courſe of nature; or that he will die in a ſhorter time, being a juſt prognoſtick from his diſorder; or that one event will ſucceed another, being agreeable to paſt experience.

If

If the chance of the event's happening within the aſſigned limits of time and place be almoſt infinitely ſmall, or if the event foretold be miraculous: the chance of ſuch an event's happening before it is foretold, is all but certainty againſt it; and the credibility of it at the time of its delivery depends on the credibility of the propheſier.

The credibility of the prophet may be rendered certainty by his performing an indiſputable miracle; or his foretelling ſomething almoſt infinitely improbable in ſupport of his prophecy, which happened accordingly.

Miracles performed by him; or ſome improbable prophecies fulfilled; though not expreſsly on account of the prophecy delivered; render the credibility great, though not ſo great as if they had been given expreſsly for a proof of the event foretold.

The eminent piety and integrity of the prophet's life, and the prophecy being delivered for apparent good and wiſe purpoſes may contribute to our belief of it: in contradiction to the latter no credit can be given to prophecy; but the bad life of the prophet will greatly leſſen, though perhaps not entirely aboliſh it; as the Supreme may for reaſons unknown to us, deliver prophecies through the mouths of perſons, who have been guilty of the moſt atrocious crimes.

2. The credibility of the prophecy between the time of its delivery and completion depends on the credibility before mentioned, and the probability of the prophecy's having been foretold.

3. At the time of completion, the event's having certainly happened, we are to enquire into the probability of its having been foretold; this depends on the evidence of former writings, &c: but if a miracle was foretold, the improbability of its happening even the hour before it did, may be equal to that at the time of the prophecy; and conſequently it will then be eaſy to prove whether it was foretold or not. The prophecies concerning Chriſt were made ſucceſſively from the creation to about 300 years before his appearance; his birth and character were ſuch as no human genius could even in thought deviſe unleſs by inſpiration, and much leſs could have probably happened according to the common courſe of nature: What is contained in the writings of the Heathens that has the leaſt analogy to it?—A God with us, a prophet, a king, a prieſt, the Lord of hoſts and glory. A ſon, wonderful; counſellor, the mighty God, the everlaſting father, the prince of peace; of his government and peace there ſhall be no end; the ſpirit of the Lord ſhall reſt on him, the ſpirit of counſel and might, the ſpirit of knowledge

ledge and of the fear of the Lord; with righteouſneſs ſhall he judge the world and the people with equity; to him (the ſeed of Jeſſe) ſhall the Gentiles ſeek, and his reſt ſhall be glorious; the Lord and thy redeemer the holy one of Iſrael; a light to the Gentiles; his own arm brought ſalvation to him; the Lord our righteouſneſs ſhall execute judgment and juſtice in the earth; the ſpirit of the Lord God is upon me, becauſe the Lord hath anointed me to preach good tidings unto the meek, to bind up the broken hearted, to proclaim liberty to the captives, and the opening of the priſon to them that are bound. —He gave his back to the ſmiters and his cheek to them that plucked off the hair; he hath no form, nor comelineſs, no beauty that we ſhould deſire him; he is deſpiſed and rejected of men, a man of ſorrows and acquainted with grief; he hath born our griefs and carried our ſorrows; he was wounded for our tranſgreſſions and bruiſed for our iniquities; the chaſtiſement of our peace was upon him, and with his ſtripes we are healed; the Lord hath laid on him the iniquity of us all; he was oppreſſed and afflicted yet opened not his mouth; he is brought as a lamb to the ſlaughter, and as a ſheep before her ſhearers is dumb, ſo he opened not his mouth; he was taken from priſon and from judgment, and who ſhall declare his generation, for he

was cut off out of the land of the living; for the tranſgreſſion of my people was he ſtricken; he made his grave with the wicked, and with the rich in his death; becauſe he had done no violence, neither was deceit in his mouth, his ſoul was made an offering for ſin; he poured out his ſoul unto death.—On the one hand poſſeſſing all power of healing, of commanding the elements, of every thing in heaven and earth; on the other hand being ſubject to all human infirmities and ſufferings, and even the moſt ignominious and painful death on the croſs. Natures ſo apparently inconſiſtent and contrary to univerſal experience, that the probability againſt ſuch being contained in the ſame perſon is almoſt infinite; and never did nor ever will happen again to the end of time. Theſe prophecies were defended and kept by the nation of the Jews, from their firſt delivery to their completion; and no doubt even by the greateſt enemies of chriſtianity ever was entertained of the truth of their being delivered before the coming of Chriſt.

4. The credibility after the fulfilling of the prophecy is as the probability of the event's having happened and its being foretold.

5. If there are more prophecies than one, then the probability of the whole is to be eſtimated from the rules before given.

1. The

1. The meaning of any paſſages of the ſcriptures muſt be deduced as of other writings from the ſenſe and meaning of the words and ſentences which compoſe them.

2. If a truth taught or delivered in the ſcripture be not comprehended by the mind; then the reader can only ſay that there is ſome propoſition delivered in it, of which he has no comprehenſion; but whatever it may be, he believes it to be true from the undoubted authority that delivered it.

3. If the mind comprehends its meaning, but the deduction is above the force of human reaſon; then it muſt be conſtrued in the literal ſenſe of the words; and if ſeveral paſſages occur on the ſame ſubject, they are all to be taken in the literal ſenſe; but if any two taken in the general ſenſe contradict each other, they cannot both be true in the general ſenſe, but muſt be reſtrained to a particular one, in which both agree; and this may be rendered more probable by the ſame terms being uſed to expreſs the particular relation not to be miſunderſtood.

4. Hypotheſes not expreſsly contained in the ſcriptures, but framed to ſolve difficulties will generally be falſe, and can be of no authority; for the proof of any thing above human reaſon requires miracles, and the conception of it divine

vine inſpiration: in ſuch proofs human authority can never be relied on, it may be ſufficient for a proof of facts, but not of doctrines ſuperior to human underſtanding: doctrines neceſſary to ſalvation will never be delivered without a ſufficient proof; nor will they be delivered in terms not intelligible; but if they were, then their explanation would require the ſame proof as the doctrines themſelves: ſearch therefore no further than the ſcriptures for the explanation of any thing above human reaſon contained in them.

If the doctrines do not regard our ſalvation, it is comparatively immaterial whether they are true or not.

5. The meaning of words or idioms deduced from correſpondent or other paſſages of the ſame book, or writer, or cotemporary and connected writings is much more probable than the meaning deduced from the writings of others; and particularly on divine ſubjects.

6. To examine controverſial points; write down all the paſſages contained in the ſcripture on the ſubject, and conſtrue the meaning of every word in ſome paſſages the ſame as it evidently is in others, and make them all agree without framing any Hypotheſis; thence probably will be deduced their literal meanings.

7. But if after all this examination there ſhould

ſhould be paſſages contained exceeding human reaſon, which are not ſufficiently explicit or have two different meanings; or different paſſages which imply different ſenſes, every word being rendered according to its meaning contained in other paſſages of the ſcriptures: then the meaning of ſuch paſſages can never be aſcertained with certainty; and ſome readers will explain them in one meaning, and ſome in another; but let them differ from each other with humility and candour; and be aſſured of this, that if the meaning of them had been neceſſary to ſalvation, the *All-good* would have delivered them in terms more explicit, ſo as not to be miſunderſtood by any one who ſought it with diligence and a proper temper of mind; but I do not aſſert nor believe that any material paſſages of this kind are contained in the ſcriptures; nor any contradictory ones, as the ſame thing exiſts and does not exiſt, the ſame perſon or being is indued with a faculty and not indued with it at the ſame time; ſuch propoſitions contrary to human reaſon and experience would appear to create a variance between revelation and reaſon.

The authority of the different readings muſt be collected from that of the manuſcripts which contain them; any reading not contained in moſt of the old manuſcripts muſt be deemed doubtful

doubtful if not rejected, and ſhould be printed in tranſlations accordingly.

Subſtances are often put in figure for others on account of ſome ſimilitudes perhaps more ſtriking, actions, ſigns or remembrances; but it is never meant that the ſubſtances are in reality the ſame as thoſe for which they are put: can we in any caſe conſtrue two different ſubſtances, one taken in remembrance of the other, to be the ſame; contrary to all other images or figures contained in the ſcripture, and contrary to the univerſal truth of nature contained in the creation? And if the fact was true, it would probably be a truth of little conſequence; as the intent for which it was done would be the ſame, and the goodneſs of the action would be according to the intent.

If one ſubſtance is ſubſtituted in remembrance of another, the latter will always by every remembrance be brought into or received in the mind.

ON MORALITY.

The principles of morality have been given different by different perſons: I ſhall only mention thoſe, which were taught by me nearly thirty years ago.

1. Morality is the law, which the Supreme has given to regulate our actions, and which is to be deduced from the light of nature. We can only

only argue from what is done by the Supreme in the conſtitution of the univerſe, to our duty; that is, what we ought to do.

2. By the Supreme we were created, and preſerved; from him alone we received the various bleſſings of this life, and from no other being do we either expect preſervation in this life, or happineſs or miſery in the next.

From hence follows the firſt law of morality; viz. our creation, paſt preſervation and all the bleſſings received in this life, require our humble and heartfelt thanks and gratitude of mind; and our expectations of future happineſs or miſery from the Almighty demand our conſtant interceſſions with him, by reverence to his name, by prayers, thankſgivings and petitions with the moſt fervent devotion of every function of the ſoul.

3. He has given us our lives and inſtilled into us a deſire of preſerving them: we muſt therefore reaſon, that he never intended for us to deſtroy what he gave, to undo what he has done; but to preſerve them, which can only be done by keeping ourſelves in health by moderation in food, exerciſe, &c: he has given us reaſon and underſtanding or the power of acquiring knowledge ſufficient to our purpoſes in this life, it cannot be ſuppoſed but that he wills us to improve it in things uſeful to our

well being here, and happineſs hereafter; and alſo forbids us to deſtroy it equally with our lives by our intemperance, which debilitates our faculties, and further takes away the means of ſupporting ourſelves by labour or genius.

4. The Supreme has given to all men equally their lives and the means of providing food for their ſupport by labour; cloaths and fire for keeping the body in proper warmth; and medicines in ſome caſes to reſtore their health; whoever therefore injures another perſon's body, or robs him of his food or deprives him of the means of acquiring it, &c. without the other perſon's, by infringing a moral law having before given a ſufficient reaſon, unleſs perhaps in ſome caſes of neceſſity; acts contrary to the will and mode of acting of his maker: in conformity to his example, he ſhould by his opulence, attention and labour, contribute to alleviate the diſtreſs of the ſick, and incapacitated to procure a ſufficient and in ſome degree convenient ſuſtenance for themſelves and families.

I now proceed to principles founded on the preceding, from which may be deduced more generally the moral laws.

5. It appears from what has been before ſaid, and from the univerſal conſtitution of nature; that the Almighty wills the happineſs of

of mankind as far as is conſiſtent with the ſtate in which he has placed them: are not the means given of ſupplying ourſelves with food &c. for the ſupport and nouriſhment and well being of the body, and endowing ourſelves with knowledge ſufficient for the entertainment and inſtruction of the mind? and the very means are ſuch as will generally contribute to our health and happineſs: but he that gives us every thing that contributes to our ſupport, happineſs and well being, muſt will our good; and no one ever can doubt, that it is our duty to act in conformity to his will: the law given, or duty of one man muſt in the ſame circumſtances be the ſame as the duty of another, for human underſtanding can diſcover no reaſon for a difference; therefore it is the duty of every man to act in ſuch a manner, that if all acted in the ſame, would have the greateſt tendency to produce the happineſs and well being and good of mankind here and hereafter.

From this method of reaſoning may be deduced the moral laws in a ſtate of nature; all the commandments except the fourth, (namely the keeping holy the ſeventh day, a law clearly expedient when given, but not deducible from human underſtanding. Is it not expedient that ſome time ſhould be allotted to teach men

world and all things in it, with a determination to deſtroy the whole again? But, I may ſay with Job, I uttered things that I underſtood not, things too wonderful for me.

11. Is it not probable, that he has placed us in a ſtate of trial in this world as a preparation for a future? Let us frame to ourſelves the picture which our weak underſtanding ſeems to afford of ſuch a ſtate; and examine how far the ſtate in which man is ſituated, may appear to agree with it.

The firſt principle that occurs in ſuch a ſtate will be the power of doing good or evil according to the will of the being placed in it.

The 2d. principle is, that probably there will be temptations from within himſelf and without to evil ariſing from ſome preſent pleaſure or gratification; and his duty conſiſts in reſiſting the temptations; and conſtantly adhering with zeal and alacrity to the laws: the greater the temptations the greater the merit of reſiſtance.

In ſuch a ſtate laws muſt be ſuppoſed given either 1. poſitive from the legiſlator himſelf, or 2. to be deduced from the relative ſtate and connections of things in which he is verſant.

In the 2d. ſuppoſition general laws muſt be eſtabliſhed; for how could the perſon diſcover the

the laws, and conſequeutly be accountable; if he knew not the conſequences of his actions.

If the puniſhment denounced immediately follows the tranſgreſſion of the poſitive law, as was the caſe of Adam in Paradiſe, no one can thence argue the exiſtence of any future ſtate; for our reaſoning can only be founded on the promiſes received, which were annulled by the tranſgreſſion.

In this caſe the perſon muſt be ſuppoſed to have arrived at the ſtate of maturity, before the law was given.

But the perſons in the firſt ſtage of their trial may be ſuppoſed to have acquired no knowledge, not even of their duty; a wiſe and benevolent lawgiver and governor will appoint perſons for their inſtructors, and none ſeem better calculated than thoſe who have been and are in the like ſtate themſelves, and conſequently are capable of inſtructing both from precept and experience, both in body and mind; it alſo appears to be the dictates of wiſdom, that the tutor and guardian ſhould have the ties both of duty and affection; of affection becauſe the world may be ſuppoſed to conſiſt of good and bad perſons, and in bad perſons the bond of duty may not be ſufficient; and the performance of his duty ſhould be repaid by the future gratitude and good offices of his pupil,

pupil, and alſo as well as of every other duty by the conſciouſneſs of doing right and inward ſatisfaction; the neglect of it ſhould be puniſhed by the behaviour of his pupil, and by the diſquietude of mind it ſhould occaſion.

A wiſe and good governor would not immediately deſtroy a being in ſuch a ſtate of trial on the firſt diſobedience of his laws, he would kindly warn him of his danger and check or puniſh him by remorſe of conſcience, pain, diſeaſe and miſery; if he ſtill proceeds in the breach of his commands, his puniſhment would increaſe; but if he becomes incorrigible, his body the inſtrument of all his actions would be diſſolved, and his trial end: happy would it be for any perſon, if his remorſe led him to attrition and repentance; for without repentance and amendment, no grounds of forgiveneſs can from reaſon be ſuppoſed; but though forgiveneſs may be obtained, yet it may be highly proper for example to others, that ſome puniſhment for the vileneſs of his former crimes ſhould be inflicted during his exiſtence in the preſent ſtate.

But on the other hand the perſon who reſiſts temptations and follows the direction of the laws, would for a reward find the reſiſtance more eaſy, the lapſes into vice leſs dangerous; and his virtuous inclinations and habits become ſtronger;

ſtronger; but ſometimes natural evils would happen to a good perſon from different cauſes for the greater exerciſe of his virtuous inclinations: and when the trial is nearly over the body would decay and then die, and he depart to judgement with his virtuous or vicious inclinations acquired:

The bodies of all ſhould not decay and die at the ſame period, for in the firſt ſtage it would be productive of many evils by acquiring bad habits not afterwards to be remedied; nor do predeterminate events of this kind appear very conſiſtent with a ſtate of trial.

When the infant arrives at the ſtate of maturity, he would be rewarded or puniſhed according to the regard which he has paid to his tutor's principles; he would find any ſtrong habits acquired whether good or bad, to be eradicated with difficulty.

Such is the ſtate of trial, which may be deduced from our reaſon and experience; but ſuch is the ſtate of man: may we not therefore conclude, that man in this world is in a ſtate of trial for the next? certainly this is no ſtate of continuance for him: the dealings of the Supreme with us in this world are the ſame as of a wiſe, good, and merciful governor with his dependents in a ſtate of trial; their removal from hence will probably be to a ſtate of cer-

tainty no more liable to fall, as a reward for their conduct in this ſtate.

12. Hence ariſes a ſolution of the moral and natural evil viſible in this world.

Moral evil is the conſequence and proof of a ſtate of trial; and natural evil will always follow moral evil as a denunciation of the evil, and a check and admonition to forſake it; and further as an exerciſe to the good, to ſhew their dependence on and reſignation to their creator.

13. Does any good and wiſe prince ever promulgate a law amongſt his ſubjects with denunciations of puniſhments and promiſes of rewards, when in reality no ſuch is intended to be put in execution by him? and will the God of truth who cannot lie, from whom nothing can proceed but truth—inſtill or even ſuffer the belief of moral government, of a future ſtate of rewards and puniſhments to enter the minds of any man, much more of all mankind, if no ſuch ſtate will ever exiſt? will he inſtill gratitude and other moral affections into our minds, if he never intends us to act from them? But if the light of nature was ten thouſand times weaker (I believe it certain) than it is, it would be our intereſt to act from it when finite is oppoſed to infinite, mortality to immortality: I have given the principles of morality both from its being inſtilled in the mind

mind and the moral conſtitution of the univerſe. Above all I muſt ſubjoin that life and immortality have been brought to light by the goſpel.

PRINCIPLES OF NATURAL PHILOSOPHY.

The independent principles or laws of matter, from which by the aſſiſtance of mathematics may be deduced the propoſitions generally given in the four branches of philoſophy.

1. Bodies or weights are found to be in equilibrium with each other, when the bodies or weights multiplied into their oppoſite velocities finite or naſcent are equal, i. e. the oppoſite motions or weights are equal.

2. The action or attraction of one body on another is equal and contrary to the reaction and reattraction of the latter on the former: i. e. the quantity of motion or weight loſt by the one, is equal to the quantity of motion or weight gained by the other in the ſame direction.

3. Bodies void of elaſticity directly ſtriking each other, never ſeparate after the ſtroke.

4. The quantity of motion gained or loſt by the ſtroke of elaſtick bodies in conſequence of their elaſticity is in proportion to the degree of elaſticity; if the bodies are perfectly elaſtick, then it will be equal to the motion gained or loſt by unelaſtick bodies.

 5. Every

5. Every body continues in its own ſtate of motion or reſt, unleſs compelled by ſome external force to change that ſtate; from the force and its direction is eſtimated the change of motion and its direction.

6. Every particle of one body acts on every particle of another, according to ſome law whether ſimple or compound, of the diſtances from each other; which at the ſurface of the earth has been found uniform and in parallel directions; and at any conſiderable diſtance to vary nearly in the inverſe ratio of the ſquares of the diſtances, at the leaſt diſtances Mr. Boſcowitz conjectures the action to be infinitely repulſive.

7. The compreſſing force of the particles of the air varies as the denſity.

8. In uniform fluids, the preſſure is as the height and denſity of the fluid into the part preſſed—the preſſure is equal in every direction.

9. The velocity of a fluid running out of a ſmall hole at the bottom of a veſſel is found to be equal to that of a body acquired by falling from half the height of the fluid.

10. In capillary tubes the quantity of water ſuſpended above the level is found to vary nearly as the diameter of the tube.

11. The reſiſtance of bodies moving in fluids; which ariſe from the tenacity, friction, and

matter

matter to be removed; are ſaid to be nearly uniform, as the velocity, and ſquare of the velocity.

12. Heat has been meaſured by the cooling of an heated body; for if the times are aſſumed in an arithmetical, the degrees of heat are ſuppoſed to vary in a geometrical progreſſion.

13. The ſine of incidence is to the ſine of refraction in a given ratio, and equal to the ſine of reflection, of light paſſing out of one medium into another. In light of different colours and different mediums, the ratio is different.

14. The apparent magnitude or viſible idea of an object is ſaid to be greater or leſs, as the picture on the retina from its laſt image is greater or leſs; the brightneſs of it to vary as the quantity of light ſpread on a given ſpace of the retina, or more generally as the quantity of light directly and ſpace over which it is ſpread inverſly; and the diſtinctneſs to be more or leſs, as the light coming from one point of the object is more or leſs intermixt with rays coming from different points.

15. The apparent magnitudes of the diameters of the heavenly bodies and their diſtances from each other, vary as the angles, that the diameters and diſtances ſubtend at the eye.

16. The particles of bodies (as appears to me) if they are acted on and cohere together only

only by attractive and repulſive powers, muſt be ſituated at diſtances from each other, which neither attract nor repel, i. e. intermediate between a ſphere of attraction and repulſion; for if they were ſituated in a ſphere of attraction the particles would be made to approach, and if in a ſphere of repulſion to recede from each other.

17. Since heat rarefies all bodies, and cold condenſes; if the force on the particles from heat and cold was known, and the attraction of the particles is not affected by heat and cold; then the attraction of the particles at different diſtances would be known.

If atoms floating in the univerſe were endued with attractive and repulſive powers, as are found to belong to the particles of all matter; they would continually move, till they were accumulated together into one uniform maſs, of which the atoms or particles would be ſituated at ſuch diſtances from each other as to be between the ſpheres of attraction and repulſion.

Theſe principles firſt given by Archimedes, Pappus, Huygens, Wallis, Wren, Galileo, Torricelli, Kepler, Snellius, Grimaldi, Newton, &c. have been applied with the aid of mathematical calculus and compoſition and reſolution of forces by Archimedes, &c. to diſcover the equilibrium and ſpecific gravity of bodies; by Galileo, who was the firſt I believe that applied

the

the compoſition and reſolution of forces to diſcover the law of bodies falling near the ſurface of the earth, either perpendicular to the horizon or projected on inclined planes; to conſtruct a refracting telleſcope; other refractors have ſince been invented, and particularly one on a new principle by Mr. Dolland; by Archimedes, Pappus, Wallis and Huygens, to find the center of gravity; by Huygens to find the center of oſcillation, explain the motion and law of pendulums vibrating in cycloids, the coronæ round the ſun, the parhelia and paraſelenæ; by Des Cartes for the ſolution of the rainbow; by Halley to diſcover the denſities of the air at different diſtances; by Newton to calculate the forces of the planets tending towards the ſun; and the lunar inequalities; and alſo to diſcover the imperfection of teleſcopes; and by Gregory and Newton to conſtruct a reflector: various additions have been made to theſe, and a great variety of other problems on different ſubjects added by ſeveral perſons; hence it appears, that a great number of problems may be added from a few principles ſubject to mathematical calculus, and every perſon who diſcovers ſuch a principle greatly promotes philoſophical knowledge.

18. The laws, which many phænomena obſerve, are unknown to us; they are ſubject to no calculus, unleſs greater or leſs, e. g.

The

The law, by which bodies are evaporated, diſſolved and rarefied by heat; and condenſed, and grow hard, by cold; the laws of hardneſs, ſoftneſs, friction, magnetiſm, electricity, moiſture, acidity, &c; and of many mechanical operations; the laws by which the particles of fluids move amongſt each other, and the ſmall particles of bodies adhere together.

Heat generally promotes the diſſolution of bodies or fluids in their menſtrua, but it has not been ſubjected to calculus.

19. An hypotheſis has been framed, that nothing can act in the place in which it is not ſituated; and conſequently no body can act on another at a diſtance from it, unleſs by means of intervening bodies or fluids.

The Almighty can give powers to bodies to act at diſtances on each other, either by intervening objects or otherwiſe; what he has done, as before ſaid, can only be known from examining and finding their exiſtence or not in nature: two things are neceſſary for a proof of ſuch fluids; 1ſt. A proof that ſuch fluids do really exiſt, which can only be deduced from our ſenſes; and 2d. on the ſuppoſition of the exiſtence of ſuch fluids that they would ſolve the phænomena.

20. Is there an electrical, magnetical, nervous, and common attractive fluid for every menſtruum?

If

If there be only one fluid, do the different effects produced at the ſame diſtances depend on the difference of the ſubſtances on which they act, or on their different diſpoſition of parts? but if more than one, a difficulty to our common conception of fluids would occur to be explained, in what manner the different fluids or particles even of the ſame fluid ſhould move amongſt each other, ſo as not to give the leaſt diſturbance; but the effects ſhould be the ſame as if no ſuch motion had taken place..

The different principles contained in nature may be infinite for any thing that we know to the contrary.

PRINCIPLES OF MATHEMATICS.

The principles on which mathematicians erect their ſtructure are few, viz: the axioms of Euclid. as 1. Two things which are equal to a third are equal to each other. 2. Add or ſubtract equals to or from equals or unequals, the ſums or remainders will likewiſe be equals or unequals. 3. Things which mutually agree, i. e. coincide, are equal. 4. Two right lines do not contain a ſpace. 5. If a right line falls on two right lines and makes the inward angles leſs than two right ones, the two right lines will meet on that ſide where the angles are leſs than two right ones: to which add 6. If we know

no reaſon for the contingency of one event in preference to another, we conclude the probability of the former event's happening, as far as our knowledge extends, to be equal to that of the latter. 7. Future things will be analogous to paſt; e. g. if one perſon out of forty in paſt times died at the age of forty ſix, it is aſſumed as an hypotheſis, that one out of every forty for the future will die at that age. 8. If the whole ſpace conſiſts of certain parts, then it is concluded that every ſpace which conſiſts of the abovementioned parts will have the ſame whole: but this may be collected from article 2.

From theſe, and perhaps a few other principles, I have ſeen about 2000, which may be deemed, independent propoſitions; I ſpeak from conjecture not enumeration. I have myſelf wrote on moſt ſubjects in pure mathematics, and in theſe books inſerted nearly all the inventions of the moderns with which I was acquainted.

In my prefaces I have given an hiſtory of the inventions of the different writers, and aſcribed them to their reſpective authors; and likewiſe ſome account of my own. To every one of theſe ſciences I have been able to make ſome additions, and in the whole, if I am not miſtaken in enumerating them, ſomewhere between three

and

and four hundred new propoſitions of one kind or other, conſiderably more than have been given by any Engliſh writer; and in novelty and difficulty not inferior; I wiſh I could ſubjoin in utility: many more might have been added, but I never could hear of any reader in England out of Cambridge, who took the pains to read and underſtand what I have written. But I muſt congratulate myſelf that D'Alembert, Euler and Le Grange, three of the greateſt men in pure mathematics of this or any other age, have ſince publiſhed and demonſtrated ſome of the propoſitions contained in my Medit. Algeb., or Miſcell. Analyt. the only book of mine they could have ſeen at that time, and D'Alembert and Le Grange mention it as a book full of excellent and intereſting diſcoveries in Algebra; ſome other mathematicians have inſerted ſome of them in their publications. The reader will excuſe my ſaying ſo much, there being ſome particular reaſons which influenced me.

In theſe enumerations I never include examples containing queſtions, which, when properly tranſlated into algebraical language, become only particulars or applications or uſual conſtructions of known propoſitions.

In pure mathematics the moderns have added ſeveral new ſciences, as I may term them, which

were unknown to the ancients, beſides very many propoſitions of a ſimilar nature to their own.

1. Arithmetic and algebra in commerce of life, by far the moſt uſeful of all inventions.

2. The doctrine of chances and annuities.

3. Logarithms.

4. The rule of falſe: viz. having found near approximations to the quantities ſought, i. e. to the ſolution of the problem required; and from thence finding how far the reſults from theſe quantities would differ from the given ones, by ſimple proportion they found more near approximations. The convergency of the more near approximations depends on the firſt approximations being much more near to one value or ſolution of the problem than to any other.

If any one quantity has two or more values nearly equal, than we muſt recur to a quadratic, &c. equation. Vid. Medit. Analyt.

5. Methods of interpolations, correſpondent values, &c. from the preceding principles extended; and others added: vid. Medit. Analyt.

6. Summation of ſeries, i. e. from the ſum or integral expreſt by a function of the diſtance from the firſt term of a ſeries are deduced the ſucceſſive parts, and vice verſâ, every quantity which is conſtituted of thoſe parts muſt have the

the ſame ſum or integral: the ſame principles have been extended to equalities.

7. Properties of conic ſections and algebraic curves and ſolids, &c. deducible from the principles of algebra.

8. Infinite ſeries: e. g. let a quantity denoting the ordinate, be an algebraic function of the abſciſſa x, by the common methods of diviſion and extraction of roots, reduce it into an infinite ſeries aſcending or deſcending according to the dimenſions of x, and then find the integral of each of the reſulting terms.

9. It has ſince been diſcovered, when the reſulting ſeries is ſuch as will converge, what is the degree of their convergency, and the interpolations neceſſary to render them converging: and the ſame principles have been applied to algebraic, fluxional, incremental and other quantities and equations.

10. The firſt principles of a method of deductions and reductions, which may be extended to geometry as well as algebra.

It is probable that in future ages new ſciences even in mathematics, and, à fortiori, in natural philoſophy, will ariſe; our knowledge in mathematics is at preſent, and perhaps ever will be, too weak for the application wanted in many caſes of natural philoſophy.

Euclid is the only book of the ancient mathema-

thematicians read in lectures—Nor do we recur to the ancients before the time of Chriſt in the ſtudies of Natural Philoſophy, Natural Hiſtory, Phyſiology, Anatomy, Chemiſtry, Phyſick, Botany, Morality, Agriculture, the various arts and manufactures, &c.; they were in all theſe greatly deficient, but the ſame will probably be the ſtate of our knowledge in reſpect to our ſucceſſors; may their increaſe of knowledge tend to render their piety, their benevolence, and every virtue ſuperior!

ON THE FACULTIES OF VEGETABLES AND ANIMALS.

1. Vegetables and animals differ in their properties from foſſils, firſt by being endued with life producing ſenſible increaſe and alteration: 2dly. with faculties proper for fructification, for the propagation of their own ſpecies: no tree or vegetable can by art, be produced from vegetables of different kinds to themſelves; the farina of the one cannot impregnate the piſtillum of another quite different from itſelf, ſo as to generate a new ſpecies; if this were commonly the caſe, we ſhould conſtantly ſee new ſpecies of plants, as the air contains innumerable different kinds of farinæ; and we could not be ſure of the ſpecies which would be produced from any ſeed: ſimilarly, no new

ſpecies

ſpecies of animals to continue can be produced. Nothing concerning the generative and aſſimilating principles of foſſils has ever been diſcovered: 3dly. by being endued with various organs and veſſels neceſſary to their ſeveral functions, viz. great part of the egg or ſeed neceſſary to its nouriſhment in the embryo ſtate; afterwards the root or mouth for the reception of the food; the leaves or lungs for inſpiration and reſpiration; various veſſels in the œconomy, viz: fibres and tubes for abſorption and evacuation; &c. 4thly with irritability, which preſerves the parts of fructification from noxious applications and an injurious temperature of the air; in animals this is greatly connected with ſenſibility; by the irritation of one part, convulſive motions are often produced in the other: this irritability remains in ſeveral parts of the body ſome time after the deſtruction of the vital principal particularly in cold animals, if their death be not gradual.

2. Our knowledge of plants principally conſiſts in diſtinguiſhing one ſpecies from another, by their ſhape, ſize and colour, the figure of their leaves and parts of fructification; in knowing ſome of their uſes to animals as food or phyſick, &c. or ſomewhat of the cultivation neceſary to their life and increaſe,

3. The

3. The faculties of animals differ from thoſe of vegetables, 1ſt. in ſenſation, reflection, feeling, and memory; 2dly. in volition and locomotive powers: 3dly. in inſtinct, which ſupplies the place of the underſtanding; the greater the underſtanding the leſs the inſtinct; it commonly directs animals in the choice of their food, particularly by their ſmell, in the nurture and care of their young; in their preſervation from injuries, and in things neceſſary to their well being; and in the actions of the ſoul on the body; but in many of theſe the underſtanding changes and controuls the direction and inclination of inſtinct. Inſtinct ends where reaſon and knowledge begin; and continues no longer than requiſite for uſe. All inſtincts muſt be deem'd ſuperior to human comprehenſion and conſequently as wonderful as the greateſt miracle: brutes are endued with natural paſſions and feelings in ſome degree ſimilar to men. 4thly. In natural language, brutes aſſociate ideas as they occur from nature in inſtinct and accidents, by which they inform their young and others of the ſame ſpecies of the place in which they are ſituated, and alſo where food is to be found, and likewiſe forewarn each other of danger; birds often ſing for their own pleaſure and amuſement, and the male for the pleaſure of the female; ſome may

be

be taught to repeat diſtinctly almoſt any word. Fiſhes have not the organs of voice, not living in an elaſtic fluid proper for the conveyance of ſound, and probably not the ſenſe of hearing.

4. The ſoul feels or receives ſenſations mediately or immediately from, and on the contrary acts voluntarily or neceſſarily on, every part of the body; for if any part be inflamed, it will create painful ſenſations in the mind: in the common healthful ſtate of the parts it receives no ſenſation from them: the ſoul may act voluntarily on the voluntary muſcles, or on thoſe partly voluntary and partly neceſſary: it acts neceſſarily on every part, for if the ſoul be grieved or ſuffer from any cauſe, the involuntary motions, the ſecretions and circulations will be affected: it may be ſaid to excite all the various motions neceſſary to it's life and well being.

5. The faculties of man differ from thoſe of brutes. 1ſt. In having a power of enlarging or abſtracting his ideas, by which he renders them proper objects for language, and in improving and exalting all his living powers: his perceptions, motions, forces, &c. are improved by the invention of inſtruments calculated for their reſpective purpoſes and uſe; and his underſtanding and will corrected and exalted

each by its proper exerciſe and both by their mutual aſſiſtance: 2dly. In reaſoning, for brutes reaſon immediately from the paſt to the future; but ſeldom or never uſe intermediate ſteps: 3dly. In their moral faculties, for brutes have no knowledge of the Supreme, deducible only by the reaſoning faculty; and conſequently perform no action becauſe it is agreeable to his commands.

Theſe principles of mechaniſm, vegetation and animation are not deducible from each other; but from the will of the Supreme.

ON THE IMPROVEMENT OF THE FACULTIES OF MAN.

1. The child having acquired the language of his own country from his parents, nurſe and others, generally proceeds to learn its alphabet; ſpelling and reading from the New Teſtament, as containing the doctrines of the chriſtian religion, and from books of ſhort entertaining ſtories uſeful and moral; he is further taught to repeat, at ſtated times, ſhort prayers and pious ejaculations, which the mind generally retains through life: this is followed by learning writing and arithmetic, as far as is neceſſary to the keeping of all uſeful accounts: at this time, or ſooner, he begins to learn the rudiments of other languages, if neceſſary:

ceſſary: in learning other languages he muſt firſt learn the alphabets as correſpondent to his own,; then the grammars, which always contain the idiom of the language, and laſtly the language itſelf from the books contained in it.

2. The reading of books in one language will little aſſiſt the learning to ſpell or write in another; as the learning of hebrew to ſpell in the greek, of the greek in the latin, and of the latin in the Engliſh.

3. The tranſlation of paſſages from one language into another will render us more perfect and clear in the latter language, and more intelligent in the relation between the languages and their idioms.

4. The learner ſhould accuſtom himſelf to write down the material paſſages, or an epitome of what he reads; from whence he will acquire a greater facility of retaining the moſt material paſſages of what he reads and hears.

I have only mentioned the common methods of ſtudy uſed in all ſchools, for probably none preferable can be deviſed.

5. The further courſe of ſtudy to be purſued muſt principally depend on the buſineſs the perſon is intended for in future life.

1. If the profeſſion intended be divinity, he ſhould apply to the ſtudy of morality, the Bible and particularly the New Teſtament; it is

written in ſuch an idiom, that the words are generally placed in their natural order, nearly the ſame as in a philoſophical language or generally in the common converſe of mankind, the beſt for dialogue and inſtruction. In ſuch a language the meaning of the ſentences can ſeldom or never be miſtaken, when the meaning of the words are known: the truth of every paſſage can only be determin'd from the manuſcripts and books in which it is contained and their authorities; if from the abovementioned authorities it ſeems improbable that ſuch a paſſage was contained in the original, does it not appear as a deceit on the generality of mankind to print it in the tranſlations, unleſs in the margin as doubtful? But is it not ſtrange when little doubt is entertained of the truth of the different readings collected from the manuſcripts, and of the meaning of them; that men ſhould differ in the interpretation of paſſages deemed by many, points of the greateſt importance? Readers ſeldom diſagree about the meaning of material paſſages contained in other proſe writers; but ſuch is the force of prejudices from different attention paid to different matters, of hypotheſes framed, of the paſſions and of intereſt.

2. What will not perſons advance, ſupport and aſſert as their belief? Things contradictory

in

in themſelves and to their own actions; an evident proof, that they really do not believe what they profeſs: ſome perſons aſſert the abſolute neceſſity of all human actions, neceſſity is the ſame let whatever name be adjoined: but does any one ever act agreeably to this belief? The neceſſarian having committed a crime, does not juſtify it before a judge on the plea of neceſſity, does not alledge that he could not act otherwiſe, that he has no other powers than a ſtone; he too well knows the hypocriſy of ſuch a plea; and that ſo far from being credited, it would ſubject him to the ridicule, contempt and deteſtation of all his hearers; and if he judges the plea which appears falſe and contemptible to himſelf and to every other man, to be no plea at an human bar in excuſe for his actions; how much leſs to the Supreme? He profeſſes himſelf otherwiſe a coward to man; but a bravo to God.

3. In conformity to his belief he cannot act from principles of morality and religion, in truth, he cannot act at all: his motions ſimilar to thoſe of a ſtone are neceſſary and mechanical: but if he will honeſtly confeſs the truth, he will acknowledge that he is often with-held from committing crimes by a principle nearly allied to the former, the fear of preſent evil, and dread of future puniſhment; it prevents him

him from taking poiſon, from doing every act hurtful to himſelf and others. Is a ſtone endued with the ſame principle? Does it forbear acting from dread of any thing future, or of puniſhment? Does not this tenet, (the contrary being by actions profeſſed on all ſerious concerns,) afford a plea for every bad action, and originate from madneſs or ſome worſe diſpoſition of the mind? If the man is not free becauſe influenced by his good, his reaſon and underſtanding, (the underſtanding in all beings will approve and conſequently influence,) then a ſtone without underſtanding and influence is the moſt free; neceſſity is freedom; but wherever underſtanding exiſts, abſolute neceſſity cannot, and the more exalted the underſtanding, generally the greater is the freedom of will, for from ignorance can proceed no will.

4. In a ſimilar manner does the perſon, who profeſſes himſelf to believe the great bulk of mankind to be damned,—to be devils, act conſiſtent with ſuch a creed? To act conſiſtently to it, he muſt act in the ſame manner to them as he would to future devils; he would even deteſt and avoid them: on the contrary he never thinks of men of good actions and ſincerity being devils, but conſiders them as men deſireable in dealings and converſe, and entitled to every act of benevolence, charity and humanity:

manity: he knows that the plea for acting agreeable to his pretended knowledge of their being damned, or devils, would not afford a juſtification to himſelf, as he really does not believe in the doctrine; and would to others when conſidered, be the ſubject of ridicule and deteſtation, as ſubverſive of every principle of benevolence and charity.

5. I know no other method (than the above-mentioned) of acquiring a knowledge of chriſtianity from reading the teſtaments; the firſt apoſtles themſelves only taught what they had ſeen and heard, and confirmed their doctrines by miracles: but if any one pretends to a ſuperior method, to inſtruction from an angel or ſpirit, to divine inſpiration, he has no occaſion to apply to the teſtaments to acquire the way to ſalvation, he needs not attend the ſermons of any man, to hear from him what that man has only learned from the ſcriptures or other writings, for the proof of which he can adduce no miracles and proceed in no other method but from his reaſoning faculties in the ſame manner as all other men; but if he is compelled to learn the doctrines and their proofs by his reaſon and underſtanding from the ſcriptures and other writings in the ſame manner as other perſons, he may be aſſured that he has no divine inſpiration more than others: but whatever

ever divine inſpiration he may have, if he cannot perform miracles in ſupport of it, he may be certain, that it was never given him to publiſh to others, otherwiſe miracles or prophecy the neceſſary means of enforcing belief would have been afforded: in default of which all rational men will juſtly conclude him either an enthuſiaſt or madman, or an hypocrite and lyar; in both caſes an impoſtor and deceiver in the moſt ſerious concerns, and certainly not truly religious; and if deceitful in the moſt ſerious concerns, not to be truſted in other matters: nor would a rational man reaſon with him on the ſubject, for on the one hand he can bring no proof but his aſſerted inſpiration, and conſequently afford no conviction; on the other hand no reaſoning can ever demonſtrate to him to be falſe, what the man from an heated imagination believes to be true; and if he does not believe it to be true, it is nearly impoſſible to extort confeſſion of falſehood from ignorance, pride and ſelf-intereſt: enthuſiaſts by ſuch war in aſſertions generally conceal their ignorance of the ſubject, which would evidently appear by an examination: if ſuch inſpiration were given, it would ſeem to be more neceſſary and uſeful in countries where true religion is not known, than in thoſe where other means are given of acquiring the knowledge of every thing neceſſary to ſalvation.

Every

Every one that thinks himſelf inſpired, ſhould examine himſelf, whether he knows the doctrines neceſſary to ſalvation, and can prove the truth of them and of chriſtianity; if he believes that he can, let him prove them to others; but if he cannot, there is an end of the credit of his inſpiration to every other man; for not knowing a proof of them, he knows not whether they are true from any other argument but the authority of others; and probably notwithſtanding his inſpiration, would have been of the religion of the country in which he happened to have been ſituated.

6. A man, who argues that every one poſſeſt of the true faith, will enjoy eternal happineſs as a reward for that faith whatever his works may be, whether done in conformity or contradiction to it, argues directly contrary to reaſon and revelation, which will ever be found to agree, as they both proceed from the God of truth; they both affirm, that the perſon who had knowledge or the greateſt degree of faith of his maſter's will, and did it not, ſhall be beaten with many ſtripes, and he who was ignorant and poſſeſſed only a ſmall degree of probability or a weak faith ſhall be beaten with few ſtripes; that every one ſhall be rewarded according to his works: will a human legiſlator admit the belief or knowledge of any laws as an excuſe

for a crime committed againſt them? Can any perſon think himſelf guilty of no crime, who acts contrary to the laws of God? Can a chriſtian think his faith or belief of any avail, who acts contrary to that belief, contrary to the commands of God as given by Jeſus Chriſt in the goſpel? Muſt he not reaſon, that the ſuperior his underſtanding and knowledge (if I may ſo term it), the greater puniſhment he merits for his tranſgreſſions of them: any pretended reverence paid to the name of God and of Chriſt will certainly be of no avail, when their commands are entirely neglected and diſobeyed by acting contrary to them; in words they profeſs to do the will of the Lord, but not in deeds: will any legiſlator, will the God of truth and wiſdom publiſh laws with denunciations of puniſhments, and then in contradiction to his publication declare them immaterial whether obeyed or not?

But if any perſon aſſerts, that the ſaving faith or belief muſt produce good works, then he aſſerts that both faith and good works are neceſſary; for by the aſſertion faith without good works accompanying, i. e. accompanied by evil works will not acquire ſalvation; and there is an end of all diſpute, for every one will readily agree that good works are of no avail, unleſs produced and proceeding from a good principle;

ciple; a true deiſt will ſay, being done in compliance with the commands of God; and further that all our thoughts, words and actions ſhould be directed by the ſame: a chriſtian would alledge according to the commands given in the goſpels by Jeſus Chriſt: various miracles have been performed by faith and truſt in God and in the name of Chriſt.

Experience and the goſpel teach, that men do not always act according to their belief, according to what they believe to be their duty, to contribute moſt to their preſent and eternal happineſs; but a ſincere belief of the goſpel, of the means given either by reaſon or revelation of acquiring eternal happineſs; and a great and frequent attention paid to them above all other matters, will excite fervent devotion and greatly influence the actions of all men, who have not habituated themſelves to vicious courſes.

2. If the profeſſion intended be the laws of the country, then it's ſtatute laws, cuſtoms, decrees of courts of judicature; forms of deeds, wills, &c., law proceedings, will be the objects of ſtudy.

2. 1. The lawyer muſt examine the agreement, diſagreement and relation between the different laws, &c., and the conſequences applicable to caſes in diſpute and further the probabilities reſulting from experience and teſtimony of

facts whoſe proofs depend on known or probable circumſtances and teſtimony; on records of court, and other given modes of evidence, to which the degrees of aſſent have perhaps been ſettled by precedent practice.

2. 2. He ſhould likewiſe conſider the degree of probability neceſſary to convict a perſon of a criminal offence, or to deprive him of property long in his undiſturbed poſſeſſion. In the firſt caſe, it is better that ten guilty men ſhould eſcape than one innocent ſuffer; for if men were to be condemn'd on ſlight (I may even add without very ſtrong) evidence all innocent perſons would live in continual fear, inconſiſtent with happineſs; on the contrary were villains too often to eſcape, the innocent would live in equal fear for themſelves and their property; the life and ſecurity of an honeſt man and good citizen are ever to be preferred to that of ſeveral who have forfeited them by their crimes.—In extending mercy to a guilty perſon, the crime ſhould not only be conſidered; but the character of the perſon and perhaps other circumſtances, from which ſomewhat may be judged of the effects ſuch mercy will produce. Lives ſhould not be taken away unleſs for crimes inconſiſtent with the good and ſafety of others; however no crime ſhould be ſo lightly puniſhed as to be conſidered as a reward,

ward, and conſequently encouragement to other perſons to commit ſimilar ones; on this principle every one ſhould be deprived of the utmoſt farthing acquired by unjuſt means.

In puniſhments for crimes wilfully committed, juſtice ſeems to demand at leaſt retaliation; in property much more ſhould be forfeited if poſſible than acquired by means knowingly unjuſt; in cruelty as murther, maiming, &c.; ſimilar or ſuperior pains ſhould be inflicted.

2. 3. A claim to property after undiſturbed poſſeſſion for many years ſhould not be admitted but on the cleareſt evidence; otherwiſe perſons would live in continual fear for their properties, as they might be deprived of them by falſe evidence, forgeries, &c., which may be calculated to give ſome grounds for any plea. A perſon not having been diſturbed, affords a ſtrong preſumption of his right, for perſons who have a claim will ſeldom leave a perſon long undiſturbed in poſſeſſion of what they deem to be their property.

All laws ſhould be framed for the good of the whole ſtate, and of individuals, conſiſtent with it.

3. In phyſic too much time ſhould not be ſpent in the ſtudy of what are called it's collateral branches, viz: Anatomy, Chemiſtry, Botany, Phyſiology, &c., to the neglect of the practice;

practice; any great knowledge of them will ſeldom be wanting in it.

3. 1. The diſorder is judged from every thing being in it's natural ſtate or otherwiſe, i. e. the ſymptoms, and from them named; and the remedies preſcribed, ſuch as have been found advantageous in ſimilar caſes from experience.

3. 2. In the collateral branches little compariſon can be inſtituted between the knowledge of the moderns and ancients, in ſome of them the latter ſeem ſcarce to have laid a foundation.

3. 3. In the practice both principally proceed on the ſame baſis, experience; but the experience of ſo many later ages is added, and the origin of new diſorders and remedies muſt have made great additions, ſo that the learned rather than practitioners conſult Hippocrates, and no one in the preſent day builds his practice on him.

3. 4. In trifling diſorders, the conſtitution, which likewiſe performs the greater part in all, cures 49 out of 50.

In law, in phyſic, the uſual routine of buſineſs when acquired, is commonly followed in the practice with great facility; but new caſes require the conſultation of books or perſons converſant in ſimilar matters.

5. The faculties both of mind and body can only be kept in health, and improved by a proper exerciſe of them, by diligence, converſation, &c.;

&c.; without ſuch exerciſe they will remain weak and incapable of performing their reſpective functions to any conſiderable degree: it ſeems agreeable to a ſtate of trial, that the living powers ſhould in a great degree depend on the voluntary uſe the man makes of them. Our well being on our mode of acting.

6. Lord Verulam ſays, converſation makes a ready man, reading a full man, and writing an exact man.

This is founded on the principle, that exerciſe creates excellence in it's own way.

7. Every thing is better taught by example than precept. To improve our reaſoning faculties therefore we ſhould recur to the books, in which examples of juſt argumentation and demonſtration are contained, and with attention examine the truth or probability of every ſtep in the demonſtration or proof; and not only read, but afterwards demonſtrate them ourſelves: in mathematical knowledge no book is ſuperior on this account to Euclid; but it would be advantageous to recur alſo to books, which treat on other ſubjects; though the reading of the demonſtrations of propoſitions on one, will certainly render us more capable and ready in underſtanding the proofs of propoſitions on a different ſubject; the more nearly allied the two ſubjects are, the more probably will the uſe

of

of reaſoning on the one, aſſiſt in reaſoning on the other: beſides in every ſcience ſome principles or axioms, are generally to be firſt clearly acquired and attentively examined, before we can proceed far with ſafety; for the failure of which we ſhall be ſometimes hampered in our progreſs.

8. Some books will teach us a habit of what I call lax reaſoning, which on many ſubjects may be preferable; by ſtrict reaſoning, I underſtand that, which in every ſtep is connected with the preceding, and conſequently brings us one ſtep on our journey further diſtant from the firſt, and nearer to the laſt, further from the data and nearer to the quæſita; it proceeds as it were in a direct road: by lax reaſoning, that which does not proceed regularly from the precedent ſtep to the ſubſequent, but intermixes them in any order that the mind ſhall think fit, or for ſome reaſons prefer; the ſame ſteps any how placed will (when attentively conſidered) deduce the ſame concluſion: the ſteps neceſſary for the proof of one propoſition may be intermixed with the ſteps neceſſary for another, or for ſeveral others; and from them the ſeveral truths or propoſitions may be infered: this method properly managed may lead us in a more conciſe but not ſo clear a way to the ſeveral propoſitions; as many ſteps of one, may likewiſe be contained in another.

9. A propoſition may be demonſtrated ſometimes by proving the contrary falſe; or it may be proved by proceeding backwards, from the quæſita to the data; this can ſeldom be the caſe in the invention of propoſitions; for the propoſitions in this caſe muſt be either known or conjectured; but this rarely happens, and is contrary to the uſual method of obſerving and reaſoning concerning nature; for we commonly proceed from the cauſe to the effect.

10. It will be uſeful for the improvement of our reaſoning faculties, and to render us greater proficients in the ſubject, to look all around (if I may be allowed to uſe the expreſſion), and examine the propoſitions in regard to their connections with each other, and extend them to extraneous ſubjects.

11. In the ſtudy of Natural Philoſophy and practical knowledge, reading alone will ſeldom create great proficiency; clearneſs will beſt be acquired from experiments and trials; a few experiments are worth a great deal of theory: a tradeſman learns his buſineſs by practice, not precept alone; and from thence acquires a facility of performing it as it were mechanically: our uſual actions and even volitions proceed with the ſlighteſt attention.

12. A mechanic learns the utility of ſome more ſimple machines by inſtruction whether

from perſons or books, and examination; when he is become a perfect maſter of the contrivances or principles contained in theſe machines, he eaſily applies them to ſimilar in others, and probably from them deduces additional contrivances, which increaſe his knowledge, and ſo on continually: let a perſon be very clear in the theory without having examined ſuch machines or any thing relative to them, he will probably find difficulties of which he was not well aware.

13. It will generally be difficult for a reader or inſpector to underſtand the ſtructure of a machine delineated on planes; and models of it probably cannot eaſily be procured; but from having ſeen and examined the delineations of ſeveral machines, the mechaniſm of which he clearly underſtands, he will ſoon be able to underſtand the delineations of ſimilar contrivances in others.

14. It is advantageous to begin the ſtudy of all ſciences with the principles on which they are founded, for all ſciences have their principles; and to proceed in a regular order, from the precedent to the ſubſequent, and ſo on till the perſon becomes an adept in the ſcience: if ſeveral principles or operations are ſimple and entirely independent of each other, it is of no conſequence from which of them the ſtudy is begun:

begun: this is the caſe in the operations of many ſciences, in Chemiſtry, in Agriculture which excels all natural ſciences in the utility and diffuſiveneſs of its knowledge, &c.; and therefore it is preferable to take them as they occur from convenience.

15. Moſt ſciences not allied to any before learned will be difficult at the beginning; but afterwards the progreſs becomes eaſy, and then rapid.

16. It may be uſeful to give that excellent precept of the great mathematician and ſtateſman of Holland, De Wit: do one thing at once: for if the mind be conſtantly diverted from one ſtudy to another, it will ſeldom make much progreſs in any; but I do not mean that relaxation when the mind is fatigued is not neceſſary: the ſtrength of the mind after fatigue is beſt recovered by ſleep; though in leſſer fatigues a change of labours and of ſtudy to others leſs intenſe, may produce a ſimilar effect.

17. In learning the rudiments or initiation of any ſcience, teachers will be advantageous and perhaps very neceſſary, till the ſcholar by reading finds himſelf enabled to proceed; and even afterwards a maſter may free him from difficulties which may happen to occur: or by remitting the ſubject for the preſent; and reverting to it ſometime after; when the mind

has loſt the train of thinking, from which at the preſent he may find it difficult to extricate himſelf and get into a new train; and likewiſe recovered the ſtrength of his faculties now exhauſted by labour and diſappointment; he may conquer the difficulties.

18. We ſhall generally become more clear in any ſubject, and find its difficulties, by teaching; and gain a more extenſive knowledge by converſing with others engaged in the ſame ſtudies; from them often may be procured hints, which may be transferred to advantage.

19. In many things it will be uſeful before we inſtitute experiments, &c. to acquire knowledge on ſimilar ſubjects. To exemplify this, a perſon ſhould acquire a competent knowledge of things in his own country, before he travels to gain the knowledge of the inhabitants, cities, cuſtoms, politics, religions, &c. of other countries, &c.

20. For confirmation or clearneſs it may be neceſſary to calculate examples or perform trials; a certain number of examples or trials properly inſtituted will in many caſes demonſtrate or prove a propoſition.

21. To the reading of books of every ſcience, a knowledge of the language in which they are wrote is neceſſary; of ſome ſciences a greater, of others a leſs.

1. Mathe-

1. Mathematics contain in ſome degree by the figures and notation a general language, the mathematical part is eaſily underſtood by a maſter; and thence with the knowledge of a few words in the language may probably be decyphered moſt propoſitions and their demonſtrations.

2. Something analogous is commonly performed by perſons in languages, and I may almoſt ſay in common converſation, in ſciences, and more particularly in poetry; very many words in all languages have different meanings; the ſame word ſometimes denotes the particular or general; many different relations, metaphorical, figurative, &c.; the ſubſtance or things contained in it; things ſimilar and allied; actions and relations ſubſtantived or perſonified; and vice verſâ, ſubſtances transformed into actions and relations, &c.; yet the mind from the ideas denoted by the remaining words contained in the ſentence, readily decyphers its meaning: of this a great many inſtances can eaſily in all languages be given, particularly in rude and uncultivated ones; for their metaphors, images and alluſions are commonly more ſtriking and forcible. Hence from the meaning of a few principal words in any language being known, may be decyphered the meaning of many paſſages contained in moſt writers.

22. Moſt

22. Moſt books carefully read and examined will increaſe the habit of attention, and improve the faculties in addition to the knowledge acquired: paſs not over propoſitions and their proofs without underſtanding them; for this often done, will create an habit of idleneſs and weak attention.

23. If the mind be too much unbent for a long time, it will with difficulty return to its uſual vigour. Some recreations and amuſements may be neceſſary; too much labour and ſtudy weaken the faculties and injure the health; a proper degree of them preſerves and increaſes both: they ſhould be innocent and if poſſible tend to promote in us piety, virtue, &c. and health; and never to their detriment. In different ages, different ſituations, ſtates of health, &c.; different amuſements, different degrees of them, and in all variety which is generally pleaſing, may be proper.

24. The memory as all other faculties is improved by exerciſe, and particularly in things allied, and in younger years.—The memory of ſubjects we are ſomewhat acquainted with are more eaſily acquired and retained than of ſuch as we are entirely ignorant of; the more perfectly learnt, the longer retained: if learnt without underſtanding and repetition, it will ſoon be loſt. It may ſeem wonderful, as the memory

mory is ſo very weak and deceitful, by what means we recollect ſo many things of ſcience and other matters; we depend commonly on ſagacity, i. e. the reaſoning faculty arguing from ſome data treaſured in the mind to others, without the aſſiſtance of which moſt things would be entirely forgot, though proofs as well as things are more eaſily recollected from having been before known. The underſtanding, the inventive faculty and the memory mutually aſſiſt each other.

25. The mind when awake conſtantly perceives, reaſons and wills.

ON INVENTION, &c.

1. To improve our faculties in the inveſtigation of truth, we ſhould uſe ourſelves to write themes on different ſubjects; and by looking on every ſide of them, deduce all the arguments of any force that we can think of; this will acquire us the habit of performing the ſame on other and particularly ſimilar ſubjects; but 1ſt. It is neceſſary to read books with attention, to inſtitute experiments, &c., ſo as to acquire knowledge on the ſubject; we ſhould alſo ſtudy books and ſciences which exerciſe the faculty of invention: in Algebra problems are propoſed, of which the reſolutions are required;

ed; at firſt we know not the leaſt in what manner to begin the reſolution, but we ſoon acquire a facility of tranſlating the propoſition given into Algebraic language, and finding the intermediate ſteps. Mathematicians depending on this, often leave ſteps in the demonſtration to be ſupplied by their readers, and properly too when their readers can only be adepts in the ſcience.

2. Mathematicians ſeldom read demonſtrations, but inveſtigate them themſelves; and if they ſometimes prove difficult, recur to ſome ſtep of the writer; or in geometrical matters to the inſpection of the figures, which commonly extricates them from the difficulty—Somewhat ſimilar is true in the inveſtigation of truth in all other ſciences, we learn ſome general principles, which will moſt commonly conduct us to the intermediate ſteps wanted in the proof of the propoſition propoſed.

3. All ſciences will be difficult till we have acquired a key to their knowledge; and if the principles aſſumed be falſe, the ſuperſtructure will probably be falſe.

4. In moſt ſciences the propoſitions are the immediate deductions of experience and obſervation, or contain very few ſteps in the proof; but in pure and mixt mathematics, ſeveral ſteps are generally required.

5. The

5. The advances of ſcience are gradual, one lays the foundation, and another builds on it.

6. In learning ſcience, reading hiſtory, &c.; when the object is the ſcience, the ſtory, the hiſtory, &c. and not the words; books wrote in the language of the country are generally to be prefered, as it is already acquired and more eaſily underſtood; and natural, not figurative language is preferable for information and improvement, as it is the more common and clear, and conſequently requires leſs attention.

A perſon may read and underſtand the meaning and excellence of a work tranſlated into his native language in a few days, which will require perhaps years to underſtand equally in its original: in figurative language readers often do not attend to the meaning and truth of the figure.

If an author writes therefore for his own countrymen, the writing ſhould be in the language of his country; but if for the literati of different countries, it ſhould be in latin.

7. The eſſential difference between poetry and proſe is the language, in poetry being metre or rhime; the ſentiments however figurative, metaphorical, &c. may equally be expreſt in proſe as metre, &c.

8. Words being artificial ſounds, the arbitrary marks of our ideas, can only be acquired

by ſtudy, and retained by memory; poetry therefore as far as the language is concerned, depends on art not nature: the poet ſhould therefore principally ſtudy the words of the language in which he compoſes, particularly thoſe contained in it, which are beſt adapted to metre or rhime; and claſs them in the memory ſo as readily to follow each other in verſe or rhime, or any order neceſſary: he ſhould begin theſe ſtudies with the reading with attention the beſt poets chiefly in the language, in which he means to compoſe; and books on poetical compoſitions; and with the compoſing of verſe or rhime; if he means to excel, from the earlieſt age, ſo as even to liſp in them; for if he neglects them at that period, he will ſeldom be induced to apply much time to them afterwards: in ſeveral other ſtudies, where utility does not command attention, perſons for ſimilar reaſons ſeldom excel, unleſs they begin in infancy.

9. The intent of poetry not being to inſtruct, for no poet is ever read on account of the knowledge contained; all knowledge is better taught and more eaſily acquired in proſe, the common language of mankind; but to enforce good and uſeful ſentiments, to pleaſe and amuſe; every ſentiment uſeful to thoſe purpoſes may naturally be introduced; every pleaſing and ſtriking image,

image, metaphor, allegory, &c. with propriety inſerted; the language ſhould be harmonious, ſuch as pleaſes the ear, of which it can only judge; but in this perſons from nature and from various cauſes will determine differently.

10. The greateſt excellence of an hiſtorian is truth: read and examine therefore all the original writers of records, and other teſtimonies on the ſubject; and from thence collect the facts, which ſeem to have the greater probability; the credibility of moſt ancient occurrences depends on the authority of two or three authors of the time, in which they happened, and their writings being faithfully copied to the preſent—the hiſtories of the firſt, rude and uncultivated ſtate of moſt nations afford often relations abſurd and unnatural, and give little inſight into truth and probability; are generally creatures of the imagination.

11. An hiſtorian, who publiſhes facts from oral and not written teſtimony, even at ſo ſmall a diſtance of time as thirty years after their happening, will generally err in the minutiæ; but he who publiſhes only from ſuch authority one hundred and fifty years after the event, will commonly be deceived even in the great outlines.

12. He who is known to publiſh a falſehood for truth, or indolently a fact with very little

examination, cannot be credited in the relation of any other, and ought to be condemned to eternal oblivion; for ignorance is preferable to falſehood: and even in ſtory and repreſentation, which is not built on truth but utility and amuſement; juſtice to the dead, and perhaps truth and morality require that no character or fact taken from hiſtory ſhould be repreſented in a falſe light, the practice of it would aboliſh all regard to future fame.

13. An hiſtorian may give his conjectures of the cauſes of events when he relates them as conjectures; or exerciſe his invention by framing ſpeeches proper to have been ſpoke on certain great occaſions, when thoſe which were really ſpoke, are loſt or forgot; in this the hiſtorian acts the part of an orator in every thing but publick delivery; in ſuch compoſitions Thucydides greatly excelled: this probable deviation from truth may be excuſed from the excellence and propriety of the compoſitions, from their being of little conſequence whether true or falſe, and their conformity to nature and the ſubject.

14. Sacred writers, when they foretell the coming, office, character and ſufferings of the Meſſiah or future facts, cannot but have been divinely inſpired; their relations of paſt facts unleſs connected with the former, or expreſſly mentioned

mentioned from divine authority, are for any thing that we can adduce to the contrary, to be judged in the ſame manner as the relations of profane hiſtorians, regard being had to the purity of their characters.

15. The probability of any material facts related being true, will be greatly increaſed by their not being contradicted at the time; unleſs cauſes are known, which might probably prevent it: hiſtorians generally agree in the great outlines.

16. The probability of a fact related being true, is as the probability of the truth of the firſt relation, and of ſucceeding writers copying it truly, multiplied into each other.

17. Story and repreſentation of it being the creatures of the mind may be expected to excel hiſtory in every thing but truth; to be more entertaining, more inſtructive in life and manners, more conſiſtent in character, and more calculated to promote happineſs, virtue and religion; but the force of truth will ever render hiſtory more uſeful and give it a preference to ſtory.

18. Dialogues wrote in metre or rhime are unnatural and ſubverſive of their principal utility, viz. improvement in common converſe: do Philoſophers, do Poets even converſe in metre? and much leſs legiſlators, whoſe laws and commands

mands ſhould be delivered with the utmoſt clearneſs, and conſequently not in metre or rhime, nor in figurative language; figurative language may have all the pomp and pageantry of ſhew, and the meaning of a page in figurative, may ſometimes more clearly be expreſt in two lines of plain and ſimple language—often on examination, thoughts expreſt in figurative language loſe their force and beauty.

19. Repreſentation not only relates facts, as ſtory or writing does, but adds perſons relating them in the common ſociety, converſe, attitudes, actions and paſſions of mankind; it may be ſaid in ſome manner to conjoin natural painting with ſtory, or to ſtory add life and actions.

When different actions happen at any conſiderable diſtance of time, or place; they ſhould neither be painted in the ſame piece, nor repreſented at the ſame time without a break: no repreſentation can deceive any perſon into the belief of reality, viz. that the ſtage is the place where, and the preſent the time when ſuch an event happened: nor that any perſon is the perſon he repreſents; nor that five minutes intermiſſion is an intermiſſion of ten years or even two hours, nor that the place of the ſtage is changed to another; nor in hiſtorical repreſentation that a perſon in the ſpace of

ſeveral

ſeveral years ſhall be no more changed than in the ſpace of an hour or two: in reading a ſtory our attention eaſily paſſes without conſidering it from one time or place to another, and it does the ſame in repreſentation without much conſideration of the length or diſtance of either: the ſeparate parts of the ſame ſtory ſhould be told as in a living picture: the perſons, and the place ſhould be drawn ſomewhat 'as may be ſuppoſed' agreeable to them they repreſent; the ſentiments, the words and actions ſhould be as near as poſſible, conformable to human nature or to real facts, to what has happened: one, perhaps the greateſt uſe of repreſentations may be the inſtruction of the audience, in the dialogues, in the common converſe of the nation, and alſo in the juſt pronunciation; the former may be learned from reading, but things are generally better taught by example than precept; the living actions add ſtrength to the ſtory and things learned by a number of perſons are by degrees diffuſed in ſome degree through the whole: hence they may be uſed to political purpoſes.

20. The pleaſure from reading a pathetic or other ſtory, may not be much inferior to that from ſeeing it acted; this generally makes a greater impreſſion on the memory and is conſequently remembered to a more diſtant time, but

which

which of them would be preferred if the latter had not the additional force of ſeeing the company?

21. Truſt no authority except divine for any thing but facts; the greateſt have erred in their reaſonings: men differ not widely in their underſtandings, the moſt difficult propoſition invented by man, can with proper application equally be underſtood by moſt others; the ſame may be affirmed of their inventive faculties; I believe that very few have applied themſelves to the ſtudy of any ſcience, before they were enabled to procure the principal books contained in it, but who proprio marte have diſcovered ſome of the inventions before given, and added others of their own: examine therefore for yourſelf, and if it does not appear deducible from nature, reject it; there is only one road to truth, but many to error, he that knows the way to truth, knows every other to lead to error, and various are the cauſes that influence and miſlead our purſuit in ſearch of nature and truth; to avoid which every ſtep ſhould be examined with the greateſt attention, and every thing that creates a wiſh or deſire ſhould be admitted with caution.

22. Some quote the authority of writers for the moſt clear and eaſy, being nearly ſelf-evident truths, and ſome even for a proof of falſe propoſitions;

poſitions; ſome quote great abſurdities for excellencies.

Diſpute not with ſuch as ground their principles on authority and not on nature; for there is no reaſoning with ſtrong prejudices: in matters of ſcience always immutable bow down to no authority; by ſtudy and application men become proficients in every art and ſcience; and when they underſtand the various improvements contained in it; the invention of no man appears wonderful, or ſeems beyond the capacity of men of moderate abilities, poſſibly not beyond their own: the ignorant think every thing great, every thing nearly a miracle; the learned approve, but not admire: I may venture to ſay this, becauſe the difficulty of ſome propoſitions invented by me, have been adjudged not much inferior to thoſe invented by any others.

23. It is ſurpriſing to obſerve the improvement that man makes in his faculties; he acquires an habit of diſcourſing in his own language as faſt as he can well ſpeak, he likewiſe reads aloud with the ſame ſpeed, or by the eye with a greater, and underſtands the things read to him with the ſame celerity; to the underſtanding of which he muſt recollect the meaning of every word read; for the change of any one word will generally change the meaning of the ſentence; though a formal definition does not oc-

cur at the ſame time to the mind: when he is become a proficient in any ſcience, he will underſtand with the ſame degree of ſwiftneſs every thing that he reads in books of that ſcience; thus the grammar of a language may be read in a day or two and perfectly underſtood; a book of Rhetoric or Logic in as ſhort a time; books of Morality, Philoſophy, Chemiſtry, &c. Mathematics, by proficients in them with nearly equal ſpeed; and every one knows that ſtory and hiſtory are underſtood without difficulty and with little attention; hence the mind eaſily underſtands the improvements made in arts and ſciences with which it has been much converſant; or often from ſome leading principles, conjectures and foreſees the work: but memory is not equally ſtrong as the underſtanding; for though a perſon underſtands, yet does he not remember but by repeated readings and attention:

24. Something ſimilar is generally true of the inventive as of the underſtanding faculties: a man having acquired a language, and the principles and conſiderable knowledge of any ſcience, is never at a difficulty to place the words (by his invention) in ſuch order as to expreſs his ſentiments; and ſeldom at a loſs to give a proper anſwer to any queſtion propoſed to him in the ſcience: a perſon cannot be ſaid

to

to be maſter of a general rule or principle, who cannot apply it to any particular caſe contained in it; that perſon may be ſaid to be maſter of a ſcience, who on a queſtion being propoſed, can readily anſwer whether it can be performed by what is known in the ſcience or not; and if it can, give the method of reſolving it: the more eaſy the method, the greater the elegance of the ſolution.

25. A man having by ſtudy treaſured in his mind words proper for metre or rhime, and done the ſame from compoſing verſes of his own and reading thoſe of others with attention, acquires by degrees a facility of rendering every ſentiment in verſe or rhime: inſtances have been publiſhed of perſons repeating extemporaneous compoſitions of many lines in verſe and rhime; but impoſitions may happen, either on the part of the hearer, which may be preſumed generally to be the caſe, when he remembers and publiſhes the very words ſpoken by the other; or of the perſon himſelf by having before compoſed or learned ſimilar verſes: I can only affirm that I never met with ſuch a maſter of poetical language.

26. The poet often exalts his ſubject by enumerating the moſt ſtriking and pleaſing particulars contained in it; and creating ſimiles, images and ſubſtitutions; this is arbitrary and like

other ſimilar habits to be acquired from the reading of books on the ſubject, application and attention; and may thence be attained to a very conſiderable degree of facility and excellence.

27. In books of ſcience, arts and of ſtory; the ſentiments, the truth and the excellence of the things contained may be judged and corrected by an intelligent reader to the end of time as well as by the writer: hence many books on ſuch ſubjects have been rendered more perfect and excellent in their ſucceſſive editions, and additions made; hence probably has ariſen the accuracy of the demonſtrations contained in Euclid's Elements of Geometry, and ſome other books.

28. But critics may probably not meet with the ſame ſucceſs in correcting language, hiſtory, and any thing which has reference to former facts; for the true meaning of the words, the idioms of the languages, and the facts to which they bear reference, may for ever have periſhed; and all conjectures may be vain and improbable.

29. If wit conſiſts in things ludicrous, or in things allied in words, in appearance but not in reality; morality and knowledge muſt differ from wit, as truth does from falſehood; as light from obſcurity: a man of underſtanding in this ſenſe will ſeldom be a man of wit, for clearly

clearly underſtanding the differences of things, he will never advance things glaringly falſe; nor will he ſtudy to become an adept in ludicrous images and falſe reſemblances.

ON COMPARISONS, SUBSTITUTIONS, FIGURES, &c.

1. Compariſons may denote relations of magnitude, intenſity, &c. as to degree, viz. the poſitive, the comparative, the ſuperlative; or any relation or ſimilitude: ſimiles denote the likeneſs of one thing to another in ſome of their properties, qualities or actions; the more exact the likeneſs, the ſuperior cæteris paribus the ſimile: the ſimilitude in things which expreſs the ſimile muſt be better known and more ſtriking or pleaſing, affectionate or paſſionate, &c. than in the things themſelves; otherwiſe the ſimile will be of no uſe.

2. When the compariſons as in Hyperboles widely differ in degree, which are mentioned as analogous; then a falſehood is aſſerted; when the falſehood is perceived and ſtriking, the compariſons will be cenſured; for no well diſpoſed mind will ever be pleaſed with an obvious and clear deviation from truth, or think it excellence. Every thing correſpondent mutatis mutandis may be advanced concerning oppoſitions.

3. In

3. In teaching knowledge ſimiles are generally uſeleſs; for if either the two ſimilitudes or things likened are exactly the ſame, the reaſoning from one will be the ſame as from the other; but if the ſimilitudes are different, then reaſoning on conceptions from one to the other will draw us from the truth accordingly: ſimiles always ſuppoſe ſome ignorance of the ſimilitude expreſt in the things themſelves, and a ſuperior knowledge of thoſe which expreſs the ſimile; and are conſequently more uſeful, ſtriking and better calculated for perſons ignorant of, than acquainted with the ſubject of the ſimile.

4. In common converſe ſimiles are ſeldom uſed; perſons generally relate every fact, every thing uſeful in the plaineſt and moſt intelligible manner poſſible, and never have recourſe to ſimiles or ſubſtitutions as figures, &c.; unleſs ſuch as are in common uſe in the language: hence as truth, clearneſs and knowledge increaſe, the uſe of ſimiles and figurative language diminiſh.

5. In ſtrong feelings or paſſions, the mind never ſtudies for ſimiles, figures, ſubſtitutions, &c.; but in violent ones uſes the ſtrongeſt words expreſſive of the paſſion immediately occurring, i. e. in common uſe, and tones expreſſive of them; but in depreſt paſſions it uſes very few words, if any; they are accompanied by

by great internal depreſſion of all the faculties and actions, often by tears; by words denoting the grief, cauſe and effect; in a dejected tone.

6. Subſtitutions in language are uſed of one thing for another in ſome manner connected with or related to it, though in other reſpects widely different; as things animate and inanimate; ſenſations, relations and feelings; ſubſtances, properties, actions and ſufferings; things preſent and abſent, paſt and future; cauſe and effect; particular and general; parts and whole; words and things; &c. time and place and things connected; and endowing ſubſtances and things with faculties which they do not really poſſeſs, or depriving them of ſome of their own.

7. The meaning of the words denoting ſuch figures, ſubſtitutions and ſimiles is to be collected from the remainder of the ſentence or ſentiment they are connected with; it may be deemed deſerving of cenſure, when not ſufficiently obvious; or two or more meanings may equally be inferred: but ſometimes the decypherlng of it is not without difficulty, unleſs it is commonly uſed: perſons in reading often do not ſcrutiniſe the exact connection and meaning of the words: the better the facts mentioned, correſpond to the thing itſelf and its ſubſtitution; the better cæteris paribus (if I

may

may ſo term it) the fable; they ſhould at leaſt agree in ſome of the principal traits: theſe ſubſtitutions ſhould be carried on through the whole fable in the ſame meaning; for if they are ſometimes expreſt in one ſenſe, and ſometimes in another; it may be difficult to explain them.

8. When things are ſaid to have different properties; whether in ænigmas, language, &c.; conſider the things which have each of the properties ſeparately, and then exclude thoſe which diſagree; or which is the ſame, retain thoſe only which have two and thence three and ſo on to all the given properties, and conſequently to the ſolution of the ænigma or queſtion.

ON THE EXCELLENCY AND SUPERIORITY OF WRITINGS.

1. The excellency of writings depends on the excellency of the language, and ſentiments; but principally on the latter; for any words repeated without ſentiments, i. e. without their meaning being underſtood, are empty and nugatory ſounds; but the ſame ſentiments conveyed in any language whatever, or if poſſible in no language at all, will (if clearly underſtood) contain the ſame ſtrength, wiſdom, goodneſs, ſublimity, beauty, pathos and every other

other excellence; and alſo the ſame ſimilitudes, images and ſubſtitutions.

2. The beſt, the compoſitions of moſt value, as far exceeding all other as infinite does finite; are thoſe, which by example, precept or ſtory, teach the means of acquiring eternal happineſs, &c. which excite the greater fervency of exalted piety and ſuperior humanity, and more reſtrain our vicious paſſions and inclinations; ſuch as create the moſt ſenſible, the moſt laſting impreſſions on the mind of piety, benevolence, humanity and every good thing; impreſſions which produce actions and regulate our lives; and not like fleeting ſhadows paſſing over fields of corn leave not a trace behind: ſuch compoſitions it is the duty of every one to read often at ſtated and other proper times, with the greateſt attention poſſible; and in all his actions to be directed by them, and from thence acquire habits accordingly.

Thoſe claim the ſecond place, which teach mankind ſomething uſeful to their ſupport and well-being in this ſtate.

Thirdly, thoſe which ſtrengthen and improve the underſtanding either by example or precept; theſe may ſometimes be included in the preceding, but ſhould never be purſued to their neglect.

And laſtly, what will innocently amuſe the

mind, and keep it free from idleneſs and every thing hurtful.

3. Thus far as to the advantage of the readers, but as to the ſuperiority of the writers.

Can the different faculties of the mind, perception, reaſon, invention, volition, actions of the ſoul on the body and moral faculties; and conſequently can their allied productions in arts, ſciences and morals be properly compared together; utility muſt ever be deemed the principal ſource of excellence; ſuperiority in this reſpect muſt be collected from the aggregates of the probabilities multiplied into the correſpondent happineſs to be received, or miſery to be avoided.

4. When nothing of utility occurs; ſuperiority muſt be left to every one to determine, and it will be different in the judgement of different perſons: in reaſoning and invention, (excluſive of language) as appears to me; it ſhould be infered from the number, novelty and difficulty of the propoſitions invented: and the ſuperiority of each propoſition invented, from the number and different connections of the ſteps with each other; and their extenſiveneſs and application, as far as given by the writer himſelf.

5. In moſt propoſitions there is no new ſtep contained, all the propoſitions of Euclid are deduced from his axioms and poſtulates, i. e. aſſumed

aſſumed theorems and problems: moſt of the propoſitions ſubjected to calculus in Natural Philoſophy are derived from the ſame, and the few principles before mentioned deduced from experience: the truths in logic and moral philoſophy are founded on fewer principles than the abovementioned ſciences: but though the firſt principles may be given, the propoſitions deduced from compounding them in a different order muſt be deemed new inventions, e. g. the propoſitions of Euclid, muſt be eſteemed new inventions though contained in his axioms: 2. the finding the fluxion of an irrational quantity; and the deducing of a ſecond fluxion from the firſt, in the ſame manner as the firſt is found from the fluent by Newton; the deducing the fluxion of an exponential quantity by John Bernoulli; the finding the fluent of an irrational compound algebraical fluxion, and ſome fluents from others by Craig, Bernoulli, Newton, Euler, in the Meditationes, and by others; the deriving from thence that the fluent of no fluxion, which contains a ſimple diviſor in the denominator can be expreſt in algebraical terms by Newton; and the ſame of any fluxion, of which the dimenſions of the variable quantity in the numerator are leſs than its dimenſions in the denominator by 1; and the principle of finding when the area, &c. of an alge-

braical curve, can be found by an algebraical equation expreſſing the relation between the area and abſciſs and ordinates contained in the Philoſophical Tranſactions of 1763: and in the Meditationes; with many others given by Bernoulli, D'Alembert, Euler, Le Grange, and others, and in the Meditationes; muſt be deemed inventions; though the firſt principles of fluxions were before given by Fermat, Barrow, or others.

6. It was (I believe) firſt obſerved in the Meditationes, that motion was not neceſſary to the integration of quantities; or which means the ſame thing, the finding of fluents and fluxions; for if the parts of an algebraical and geometrical, or other quantity agree or are always equal to each other; then the wholes or integrals will be equal.

7. In a ſimilar manner from known principles, Taylor and Mommort, &c. found the integrals of the two increments $x \times \dot{x} \times \ddot{x}$, &c. and $\frac{1}{x \times \dot{x} \times \ddot{x} \text{ &c.}}$; $\dot{x}$, $\ddot{x}$, &c. denoting the ſucceſſive integrals of x, $\dot{x}$, &c. &c. other propoſitions on the ſubject have been ſince added; in the Meditationes from ſimilar principles, are given methods of finding whether the integral of any algebraical function of one or more variable quantities can be found by finite terms of

of them, or logarithms; and correſpondent propoſitions to moſt of the abovementioned fluxional added—theſe muſt be deemed equally new invented propoſitions.

8. The acquiſition of ſome knowledge depends not ſo much on reaſoning as on experience, i. e. trials and obſervations, e. g. geography, which deſcribes the principal and remarkable places and boundaries of countries; theſe can not be ſettled by reaſon and invention but by actual ſurveys, and the finding the latitudes and longitudes of places; their accuracy muſt depend on the care and ſkill of the ſurveyors; and the excellency of their inſtruments, probably invented and made by others: theſe ſurveys or obſervations performed ſeveral times; and a mean of thoſe, which to the obſerver ſeem to be the beſt taken, will generally give a more accurate reſult, than when collected from one ſurvey or obſervation only; unleſs the vigour and attention of the mind in the prior be remitted: the errata from the inſtruments only will remain the ſame as long as the inſtruments, and every thing that acts on them ſo as to contribute to the obſervation, remain the ſame; and the errata of the obſervations ariſing from theſe different cauſes, may be calculated from their different errata: the errata from the deficiency of care and ſkill muſt be ſuppoſed when

no

no reaſon can be aſſigned for its erring on one (the affirmative) ſide of a given quantity in preference to the negative, to be ſometimes on the one ſide and ſometimes on the other; and thence in moſt caſes the mean of ſeveral obſervations will err leſs from the truth, than one taken indiſcriminately: if an hypotheſis was aſſumed for the probability of the happening of every erratum; from the law aſſumed may be deduced the correſpondent probability of the abovementioned mean being contained between given limits.

Similar principles, i. e. the mean of more attentive trials and obſervations may be applied to the operations of Chemiſtry and of natural appearances in general, and even of the faculties of the mind; for none of our faculties are perfect, and the firſt deduction of the mind is ſeldom to be much depended on; ſubſequent obſervations or deductions are generally more to be depended on than the preceding.

9. The earth being bounded no where by right lines, but conſtantly unequally aſcending and deſcending from the horizon; a ſource of inaccuracy will thence ariſe, and conſequently ſome error in the geographical diſtance; unleſs the exact angles of aſcent and deſcent were conſtantly taken; but ſome inaccuracy in every thing

thing will occur: the errors in meaſuring the ſurface of the earth, generally ſtiled meaſuring land, will commonly in proportion far exceed the errors of the diſtances; moſt fields are ſeldom nearly level as a plane, but generally banky in their different parts; and every ſurveyor who is perfect maſter of the art, may by the common mode of meaſuring in ſome caſes conſiderably increaſe or diminiſh the meaſure of them: thus in a field, of which part is on one ſide of a hill and part on the other, if a line be drawn ſtraight as poſſible from a corner on the one ſide to a corner or angle in the other; and if perpendiculars may be drawn from an oppoſite corner to the ſame line on the different ſides of the hill, which in ſome caſes will differ in a great proportion, then conſequently the ſurvey of the land as abovementioned may be made to differ in that proportion: in ſomewhat ſimilar a manner, if banks are contained in the middle of a field, the meaſure of the field will differ according as the baſes and perpendiculars are drawn: ſimilar principles may be predicated of the boundaries and lines drawn to the angles from any given points.

10. The excellence of hiſtory primarily depends on the truth, number and importance of the facts related in it; and ſecondarily on its being delivered

delivered in a natural order and agreeable language: wiſdom and prudence are learned from paſt experience and examples of others; the errors committed by perſons admoniſh us to avoid ſimilar ones, and their ſucceſs encourages us to purſue their ſteps: hiſtory teaches the lives and manners of men and their conſequences; feigned ſtory does the ſame, but never creates equal attention and confidence, nor ſo laſting an impreſſion.

11. Hiſtory and ſtory ſhould generally proceed regularly as to time, phyſics as to cauſe and effect; i. e. precedent and ſubſequent events, and reaſoning from known truths to unknown.

12. Writings of leſſer moment, which barely concern amuſement and not utility or knowledge, have no fixed ſtandards of excellence; and can only be ſaid to be agreeable, pleaſing, ſtriking, or to excite ſome other affection; but theſe will be different in different perſons, according to the education, buſineſs, ſtudies and various occurrences of their lives: principles of amuſement cannot be generally deſcribed, they are derived from an innumerable number of ſources.

13. The poet's fancy wanders through the whole regions of nature and learning, in ſearch for ſimiles, images, and ſubſtitutions, ſtriking and pleaſing to the mind; to raiſe, exalt and dignify,

nify, and ſometimes familiariſe his ſubject: one ſubject indeed, the Supreme and his attributes, ſublimity itſelf, whoſe actions in grandeur, greatneſs, wiſdom and goodneſs, &c., infinitely ſuperior to the utmoſt ſtretch of conception of the moſt exalted creature; can never be raiſed by any ſimiles, images or ſubſtitutions; ſome of his actions may be particulariſed, and ſome brought to our level and rendered more familiar by them: every ſimile depreſſes, not exalts this ſubject.

2. But ſhould any ſimiles, &c. be deduced from the heathen mythology; from falſhood, abſurdity, immorality and impiety? Should an author intermix the knowledge of our Creator and Governor with the abſurd and immoral tales of the heathen gods and goddeſſes, things contradictory and entirely inconſiſtent with each other? If the latter are introduced as founded on truth, a falſhood is aſſerted; but if introduced as falſe and impious ſtories, ſhould they not be rejected as ſuch? What utility can be produced by ſtudying them, is it not loſs of time and filling the mind with impious and immoral ſtories to the excluſion of uſeful knowledge? Is not the Almighty a jealous God, has he not commanded us to have no other Gods, nor graven images, nor likeneſs, and as it ſhould ſeem conſequently no great

alluſion to any other, nor much attention? Would it therefore not be deſirable, that heathen mythology ſhould be condemned to eternal oblivion? I only aſk theſe queſtions, let others determine them.

3. The moſt forcible and exalted language, ſimiles, images and ſubſtitutions may be proper and uſeful, for the exaltation of ſublime ſubjects in poetry; and exciting more fervent devotion in pſalms, particularly when they have been commonly uſed for that purpoſe, and in a common tone, the ſame tone will generally produce ſimilar effects; for the paſſionate threatenings and denunciations of vengeance, and for many other ſubjects; but of this let every one judge from the effects produced in his own mind.

4. The deſcription, images and ſubſtitutions on religious ſubjects contained in the ſacred writings: viz. on the power, knowledge, wiſdom, and goodneſs, (attributes neceſſary to the governor of the Univerſe, and in ſome degree to every inferior); on the creation, providence, the majeſty and glory of the Supreme; the pride, impiety and oppreſſion of men, and from thence the miſery; the ſwift deſtruction and deſolation of cities and countries; the pleaſing deſcriptions of univerſal peace and happineſs; of death; the light of the goſpel, ſalvation of mankind,

mankind, reſurrection from the dead, and future judgement; are eminently ſuperior to any contained in the ancient writers.

5. In imitations it is preferable to begin our ſtudy with inſtructors, books, capital performances of eminent men, and laſtly to proceed to the ſtudy of nature itſelf, and examine the works of others by it: excellence is to be deduced from comparing and obſerving the ſimilitude, reſemblance and connection of the ſeveral and particularly the principal parts, appearances and actions: copy nature in itſelf, nor pretend to excel her, by taking different parts from different ſubjects, for they will not naturally agree together, and our underſtanding is little able to diſcover what is the more uſeful and ſuperior, otherwiſe than from the moſt ſtrict adherence to nature. That work muſt be deemed ſuperior, which beſt reſembles the original, particularly when it is the moſt beautiful and ſtriking in nature, and moſt known and excellent in ſtory, for thoſe imitations ſhould generally have reference to ſomething known; and that moſt pleaſing which beſt copies nature in her moſt beautiful and graceful form and dreſs—ſuperiority in imitation, in utility muſt be determined from experience and reaſon; beauty, grace and other affections as before ſaid, have no fixed ſtandard,

but are derived from conformable feelings in ſenſation and utility.

6. Perſons of ſuperior faculties may in ſome reſpects from their own ſenſations judge ſomething of the correſpondent ones of beings of inferior; but on the reverſe, perſons of inferior faculties can never determine concerning the ſenſations of perſons of ſuperior; e. g. a line may appear crooked to a perſon of a microſcopic, but ſtraight to one of a common eye; the former by his reaſoning faculties can prove the appearance of the ſtraightneſs to the common eye, but the latter can never demonſtrate the crooked appearance to the microſcopic; ſomething ſimilar ſeems probable concerning colour and other qualities; and ſimilar truths may be concluded of all the ſenſes and faculties.

7. In natural phænomena, as before mentioned, the ſame cauſes produce the ſame effects; but on the contrary, ſimilar effects may proceed from different cauſes: in life and manners the ſame effects may proceed from different cauſes; and alſo, in voluntary actions, the ſame cauſes may produce different effects; whence from few voluntary cauſes is produced a certainty of the effects, but different degrees of probability; the cauſes of our actions generally are and ought to be, a conſideration of future probable events,

events, as to happineſs and miſery, agreeable and diſagreeable.

8. In a ſyſtem of life and manners all different cauſes, circumſtances, actions and relations, not only when ſeparately, but when aſſociated any how together, happening to different perſons at all ages; poſſeſt of all different tempers, diſpoſitions and habits; in the various paſſions and ſtates of health, of mind and body; and endued with the various knowledge of manufactures, arts and ſciences, of life and manners; and entertaining the different principles of religion, morality and policy; and ſimilarly to nations; are to be conſidered, and the uſual conſequences deduced; they may be claſſed under general principles: the conſequences or effects can be deduced only from paſt experience and obſervations of ſimilar ones: and thence innumerable ſtories amuſing, inſtructive and uſeful, may be framed.

From hence, namely experience; from reaſon, and advice, precept and example of others may be collected, the cauſes moſt likely to produce any effects in life and manners; from whence and the avoiding all temptations to every thing bad, and promoting with zeal all tendencies to good actions, from keeping good and avoiding bad company may be deduced the cure and reformation of all bad thoughts, words,

words, actions and cuſtoms; and the promotion of every good.

ON TASTE.

1. Our actions, our inclinations and taſte, ſhould be directed by morality, utility, eaſe and convenience; regard being had to future as well as preſent; if our taſte, our inclination be perverted in contradiction to theſe principles, it ſhould be corrected and amended agreeable to them; but in matters where the abovementioned principles are not concerned; where we have no ſtandard of determining either from nature or reaſon; our actions, taſte and inclinations are generally and properly ſubjected to habit, and faſhion and education generally conformable to it; the former cannot be removed without ſome difficulty and uneaſy feelings; and a complaiſance ariſing in ſome degree from benevolence, creates a pleaſure in acting and reducing even our inclination and taſte in conformity to the faſhion, i. e. to that of the generality of the perſons we are converſant with; but faſhion founded on no principle of utility will vary with time, and cannot be deemed perpetual; a taſte, or actions in oppoſition to the faſhion, will commonly appear aukward and diſagreeable.

2. It

2. It has been controverted, whether our taſte in ſubjects of no great utility ſhould be directed by the faſhion of the ancients or the moderns; on ſuch ſubjects men will generally pleaſe themſelves; ſome perſons from education, regard to antiquity, or the pride of literature, will prefer the ancients; others from complaiſance, will conform to the taſte of the preſent time.

3. If it be ſaid that our taſte ſhould always be ſubjected to nature: nature poſſeſſes little order, unleſs required by utility; ſhe places vegetables in ſoils proper for their nouriſhment and increaſe in an infinite variety, and conſequently in very little order; it being her intent, that man ſhould cultivate the ground in the manner moſt uſeful and pleaſant to himſelf: but in every thing that utility requires, nature invariably follows its direction.

Similarly ſhould be the taſte of man, when no ſtandard from nature or reaſon, even to a diſtant utility can be deduced; a great, perhaps an equal latitude may be allowed; and faſhion, inclination, habit or aſſociation, become the ſtandard: by aſſociation what is offenſive to one ſenſe, becomes diſagreeable to others, and even to the recollection.

4. If it be advanced that our taſte ſhould be directed by a pleaſant ſenſation or feeling,

agreeable

agreeable acquired aſſociations; a conformity to ſome deſign or appearances of diſtant utility; grandeur, beauty and novelty, or ſome other cauſe: in the former, our own ſenſations, feelings and aſſociations muſt direct us; and in the latter, our ſenſations, judgment and reaſon.

5. In writing the ſentiments ſhould follow each other in a regular and connected order; it being advantageous both to the underſtanding and memory; they ſhould proceed from the origin in the natural order, to the concluſion of the ſtory; from the cauſe to the effect: another rule, that feeling ſeems to indicate, is, that they ſhould proceed from things leſs pleaſing, and lower, to more pleaſing and exalted; from matters of leſs importance, to others of more; for if they proceed in the contrary way, the expectations will firſt be raiſed to a higher pitch, and then the mind will be diſappointed on their being depreſt: in many things the mind becomes weary, and requires an exaltation of the ſubjects to keep it in an equal, or raiſe it as it proceeds to a ſuperior tenor; hence it is generally pleaſed with any unexpected pleaſingneſs or excellence, unleſs counteracted by ſome contrary feelings.

ON THE STRENGTH OF THE FACULTIES OF THE MINDS AND BODIES OF MEN OF THE PRESENT, COMPARED WITH THOSE OF FORMER AGES.

1. The moderns can with eaſe underſtand all the knowledge, propoſitions or arguments delivered by the ancients, and when underſtood ſee the truth or falſehood of them; it equally appears from what has been publiſhed by the ancients, that they could as eaſily have underſtood thoſe, which have ſince been diſcovered by the moderns.

2. The ancients invented propoſitions of equal difficulty in mathematics, in various arts and ſciences, and made as rational obſervations on the lives and manners of men, as thoſe ſince adduced by the moderns: may we not therefore conclude that no proof can be aſſigned for the ſuperiority of the mental faculties of the one to the other.

3. The firſt principles of all knowledge may be deemed the obſervations of experience, and not the deductions of reaſon; hence every fact not deducible from others before known, may be eſteemed a firſt principle; the more particulars included in it, the more general the principle: it is reaſonable to ſuppoſe, that thoſe in the moſt neceſſary and uſeful ſciences would be

firſt learnt, either from nature or inſpiration; and conſequently be given by the ancients; in experimental philoſophy, the obſervations ſhould if poſſible be ſubjected to calculus, or no great advances can be expected from them; in later times, Kepler diſcovered the areas deſcribed in equal times round the ſun, by the ſame primary planet to be equal; and the ſquares of the periodical times to vary as the cubes of the mean diſtances of the planets from the ſun, which he found to be ſituated in the focus of the ellipſes deſcribed by them. From whence has been deduced almoſt the whole of the preſent excellent ſyſtem of phyſical aſtronomy.

4. It ſhould ſeem probable reaſoning a priori; that rational piety, benevolence, humanity, true magnanimity and heroiſm of mind, reſignation to the divine will and obedience to its commands would be ſuperior; and the actions of mankind more virtuous and leſs vicious ſince the publication of chriſtianity, as the former are excited, and the latter reſtrained by arguments of ſuperior force and probability; otherwiſe regard to future, to infinite happineſs, and to the avoiding of miſery, has little influence on the actions of man.

5. All mechanical bodies, ſpace and time, ſenſations and mental faculties, muſt be ſuppoſed nearly, if not perfectly correſpondent in

their properties and relations in the preſent to what they were in former ages.

6. The ſtrength of the body and its faculties in paſt times, cannot ſo ſatisfactorily be determined; as we have few proofs to be depended on, of the height, meaſure, ſpeed, weight and force of men of former times; this is ſomewhat ſurpriſing, as the height, meaſure and ſpeed, can eaſily be ſettled, either from known diſtances and time, or as is now known from the ſpace a body falls through in a given time; and the weight and force may be deduced from the weight of a determined meaſure of any known body; but it may require many experiments and meaſures to affix the ſtandard as to the medium, and perhaps the ancient philoſophers were not ſo much given to meaſures and calculations as the modern.

To reaſon from the little knowledge we poſſeſs on the ſubject: 1. The generality of men live in the preſent time, nearly to the ſame period that they lived ſome thouſand years ago; but is it not probable, that if their bodily ſtrength had been weakened by diſeaſe, &c. they would not in general have attained to the ſame period of life?

2. If we compare the ſtrength of men of the preſent times, with thoſe of ſome ages immediately preceding, experience will not diſcover a difference.

3. If we argue from huſbandry and other works to be performed for the neceſſary uſes of life, we ſhall not conclude them greatly unequal; but nature to every living being allows not only the ſtrength, which is abſolutely neceſſary for its common ſupport and preſervation; but ſuperadds much more for its convenience, eaſe and pleaſure; otherwiſe too much fatigue would generally enſue.

4. No ſuperiority of greatneſs of body can be collected from the remaining Egyptian mummies.

5. If we reaſon from the works known and remaining, we ſhall conclude the buildings, canals, &c. of the preſent age in general to be ſuperior to thoſe of the paſt, both in utility and greatneſs: but if from the pyramids of Egypt, or ſome few particular monuments, &c. of great ſtructure; it may be anſwered, that under the ſame circumſtances, the ſame tyranny and oppreſſion exerciſed by one nation or people on another, &c. equal works would be produced.

6. Hence by reaſoning from experience of what has been done or happened, (extraordinary interpoſitions of providence excepted) no difference can be adduced of the mental and bodily faculties of men in the preſent and paſt times; and probably the faculties and properties of

man,

man, of the reſpective animals, of vegetables and foſſils in future will not differ widely in the ſame circumſtances from correſpondent ones in the preſent day.

7. In the preſent greater application and ſtudy is neceſſary to become an adept in arts and ſciences than in ancient times; as the moderns have diſcovered many new ſciences and carried the knowledge of the ancients to a much greater extent, and accuracy; it is neceſſary therefore for that purpoſe not only to learn the inventions of the ancients but alſo the additional ones of the moderns: thus far as to knowledge; but as to languages the ancients ſeldom and perhaps never learned any languages from books only; but from the converſe of others, in the ſame manner as every one learns the language of his native country; the Hebrews and the Greeks originally only learned their own language, or the latter in ſome very few caſes their own and the Egyptian; the Latins, their own and the Greek; but in modern times the literati generally from books only, learn ſeveral languages, ſometimes unneceſſarily, in addition to their own: the road to knowledge through any but the native language, is round about, uſeleſs and unpleaſant, laborious, and rarely in the acquiſition of any uſeful knowledge, but of divinity and commerce purſued.

8. The

8. The modern invention of printing has rendered the means of acquiring languages by books more generally diffuſed and more eaſily procurable. A moderate ſcholar in the preſent time on the whole, is probably ſuperior in ſcience, to the moſt learned of the ancients.

9. The moderns generally excel in manufactures and arts; they commonly examine the truth, reaſon and principles of things in every ſcience (mathematics excepted) more to the bottom (if I may uſe the expreſſion): their principal languages are more accommodated to converſe; the underſtanding, and acquiſition of knowledge; being more plain, eaſy and natural in oppoſition to the more inverted, difficult and figurative, of ſome of the ancients. Some moderns from obſcure paſſages, which conſtrued in their utmoſt extent mean very little, or nothing; would conclude the ancients to be poſſeſt of knowledge far beyond any thing contained in them; and which is expreſſly contradicted by the greateſt abſurdities of the ſeveral authors, on the ſame ſubjects; proving not only their own ignorance, but the prejudice of ſuch modern writers.

10. An argument in contradiction to the opinion before mentioned, has been publiſhed: viz. mankind by their luxury and vice render their progeny weaker, and conſequently every ſucceeding generation will be weaker than the

preced-

preceding: arguments deduced a priori, and not from experience, in ſuch matters are ſeldom concluſive; this argument ſuppoſes every man to produce a progeny, of which none are ſtronger and more healthful than himſelf; but this is contrary to experience: a profligate, diſeaſed and debilitated man, will probably generate children diſordered and weak; but the children, grandchildren, &c. will either die, or by regular living and healthful food, wear out the weakneſs and diſeaſe, and reſtore the former health and ſtrength; ſuch a power of reſtoration prevails in man: whence human nature generally vibrates between certain limits neceſſary to its exiſtence, actions, buſineſs and eaſe: the generality of mankind in every country live moderately regular, either by neceſſity or choice; there are very many inſtances of perſons of regular lives at an age between ſeventy and eighty, and conſequently to be ſuppoſed weak in body, begetting children which became ſtrong and healthful perſons.

11. Some poets have deſcribed men of preceding ages, as poſſeſſing double the ſtrength of the ſucceeding; a deſcription, which renders it very probable, that the authors lived ſeveral ages after the ſubjects on which they wrote, which may in ſome degree account for the credit they gave to the falſe, ridiculous and impious

pious ſtories of their gods and goddeſſes, and even of Jupiter their ſtrongeſt god, and independent Supreme, whoſe will was ſuppoſed fate, and who commands all things; for the wiſdom commonly aſſigned to them is folly, the actions vices, and power weakneſs; not much ſuperior are the tales of the heroes and their battles; ſuch as cannot happen in the preſent times, and therefore uſeleſs and unintereſting; and ſuch as never happened in any former time, and therefore falſe and abſurd: equally unnatural and abſurd are the many feigned creatures the vitious (as contrary to reaſon and experience) productions of a luxuriant imagination.

12. In the ſame manner as the great Bacon in his wiſdom of the ancients ſometimes proceeds, whoſe attention is generally fixed on creating ſimilitude, may almoſt any one thing be deduced from any other, by genius and ſubtility; he too often delivers obſcure wiſdom, conſiſting much of ſimiles, and ſubſtitutions; and frequently gives conjectures, not proofs. Perſons muſt have been highly abſurd to have delivered and concealed the plaineſt truths in the moſt obſcure ænigmas. However it muſt be acknowledged, that the ancients were much given to deliver their knowledge in far fetched alluſions.

13. The

13. The Iliad, the Odyſſey, the Æneid contain facts, moſt of which are ſelf-apparently falſe; but when ſuch unnatural facts are contained, it evidently follows from the internal evidence, that fancy not truth was the object of importance with the writers, and thence every fact built on the relation of ſuch authorities only muſt be deemed if we reaſon concerning them, in the ſame manner as concerning others, more probably falſe than true; and the whole poems, the creatures of fertile imaginations; add to this, ſo little external evidence can be adduced in favour of the outlines even of Homer's poems, and ſuch ſeems from the above reaſon, the diſtance of time between the ſiege of Troy and the writing of them, as to render the oral teſtimony of every fact imperfect and uncertain, and the relations of moſt of them aſſuredly falſe.

Theſe conſiderations of the internal and external evidence muſt create a doubt, if not a diſbelief of every fact contained in the before mentioned poems, which is not corroborated by other authorities.

14. The intended moral of Homer's Iliad, has been ſaid to be: " delirant Reges, plectuntur Achivi:" but does this appear from Homer? for he never utters ſuch a political maxim; he only invokes a goddeſs to ſing the anger of

Pelides Achilles, which proved deſtructive to the Grecians, and which deſtruction (he afterwards mentions) was produced by Jupiter to confer honour on Achilles, in compliance with the petition of Thetis: the Iliad, the Odyſſey the Æneid ſeem only to contain tales amuſing to the mind, and to have no moral nor uſeful deſign; unleſs that of encouraging ſacrifices to the gods, which are generally inculcated as a duty; and the offering of them repreſented as fortunate, and their neglect puniſhed: the diſpoſition of mind which produces piety, is commendable, when ſincere, though erroneous; the worſhip of the Supreme founded on rational and conſiſtent principles is certainly the moſt ſublime moral, that human nature can deviſe: theſe poems were probably founded on the mythology and tales of the times; but I muſt refer it to others; how far the ſpending of years in learning ſuch tales is uſeful and expedient? Truth and nature in all ages are the ſame; real excellence in one age, will be the ſame as in another.

15. The ancients excelled in oratory, in pleading of cauſes; it was the principal employment of many the moſt diſtinguiſhed for abilities: in this the language and the arguments are to be conſidered; the language whether delivered to the people, the ſenate, or the judge, ought

ought to be the moſt clear and perſpicuous; the only uſe of it is to expreſs the ſentiments; if the ſame ſentiments delivered in the ſame order are clearly underſtood, they will have the ſame force and conviction on any rational mind, whatever may be the words which expreſs them; and anſwer all the purpoſe intended; for the ſentiments, not the words are conſidered.

16. With regard to the ſentiments, the ancients and moderns are ſituated on a level as to the advantages: no knowledge, no arguments are neceſſary; but what are derived from the cauſe in diſpute, and its circumſtances applied to the general principles of juſtice, humanity and expediency or policy; the laws of the country and of nations: of theſe, perſons of equal abilities and applications in all times could judge and determine equally: to compare them together, write down all the facts contained in any of the orations of the ancients, and proprio Marte, deduce the different arguments reſulting for and againſt the queſtion, and the apparent probability; they will generally be found ſuch as are contained in the oration; but if any arguments of much force ſhould be omitted, it argues a weakneſs of the underſtanding or attention in the one or other: in the arguments for and againſt the queſtion, may be ſaid to be contained all the real force

of the cauſe; and what remains is to enforce them on the minds of the judges, i. e. to bring them forcibly and clearly home to their judgements and boſoms.

17. The different parts of pleading are ſaid to be the narration of the cauſe, the proof, the confutation of the oppoſite, and the enforcement of the arguments.

The force and ſtrength of arguments will generally be concluded agreeable to paſt experience.

ADDENDA ON TIME, SPACE AND FEELINGS, &c.

1. Time only means preceſſion and ſucceſſion: ſpace, diſtance and its one, two or three dimenſions, length, breadth and depth; motion ſuggeſts a fourth dimenſion, a quantity as great in proportion to a ſolid, as a ſolid to a ſurface; and imagination innumerable. To proceed downwards, points have been ſuppoſed in different ratios to each other; and in the Philoſophical Tranſactions the point in which a globe touches a plain has been deduced from reaſoning equal to a line: by imagination and ſimilar reaſoning, points may be deduced of different dimenſions.

2. Time appears to man longer, as the continuance of the ſame ideas or ſucceſſion of different

different ſeem longer: a given time appears longer, when an uneaſy feeling or painful ſenſation principally continues in the mind; and the ſhorter as the oppoſites prevail: when there is no idea in the mind, as in ſound ſleep, there is no perceptible time; and when none but agreeable ones, the time ſeems ſhort, and we wiſh for the lengthening of it; but in this ſtate wearineſs will occur, and the time ſeems ultimately long, till ſleep recruits the ſpirits—on this principle, the more happy and leſs miſerable the ſituation of beings, ſuch as man, the ſhorter to them the appearance of time: from hence no meaſure of it can be adduced, nor even from the ſucceſſion of our ideas, for we never enumerate the number of ideas which ſucceed each other; nor if we did, could we tell the time, for every idea does not remain an equal time before it is ſucceeded by another.

3. Time is generally meaſured by us from the motion of bodies, ſpace from meaſures of diſtances, angles and time.

4. Feelings differ in ſtrength, in force and violence, in being pleaſing, diſpleaſing or uneaſy, agitated, depreſſed and in various other ways: when pleaſing feelings and ſenſations are continued for a length of time, they create happineſs; and when diſpleaſing and painful, miſery.

5. Senſa-

5. Senſations contain pleaſure and pain; feeling, joy and grief; joy ariſes from pleaſing, grief from diſpleaſing and uneaſy feelings: by pain in feeling, is often meant a great uneaſineſs: feelings cannot be diſtinguiſhed by a great degree of reſemblance; nor from enunciation only, ſimilar ones produced.

6. In ſome caſes the recollection of the cauſes, which produce them, will create ſimilar but more weak feelings on the mind for a conſiderable time; but commonly after a ſhort time, the memory of their exiſtence only remains from a recollection of their cauſes and effects, and of the violence of them.

7. The mind in violent feelings or paſſions ſeldom much notices any thing, that has no relation to the paſſion; but if it does notice any thing elſe, it generally creates a relation, or refers it to them.

8. As the mind can only reflect on one ſubject at once, ſo only one paſſion can exiſt in it during the ſame time; but when more agitate the mind together, it conſtantly recurs from one to the other, and generally dwells principally on the moſt violent.

9. Strong and violent feelings from ſimilar cauſes, commonly produce ſimilar effects on the language, the actions, the voice and countenance of man; we generally reaſon from the

cauſe

cauſe to the effect, and drop the intermediate feeling: every man therefore in ſome degree judges of the feelings of others from his own; and alſo on the effects of ſimilar paſſions: by ſome cauſes or feelings, men are rendered more benevolent, by others more cruel; and ſo of other paſſions.

10. From what has been ſaid, it appears that the effect of each paſſion and feeling may generally be known from a man's experience of it in himſelf, e. g. Anger in the firſt moment commonly produces threatenings, and a deſire of correſpondent revenge, which goes beyond the bounds of prudence; and is ſoon repented of on moral and other conſiderations, or from a ſoft anſwer given: the anger returns on a freſh provocation with correſpondent force, and is ſimilarly repented of.

2. Love and grief for the death of a dearly beloved object prey on the mind, and like madneſs keep almoſt ſole poſſeſſion for a long time, perhaps to ſome degree through life: the thoughts in the former, will be on the perfections and fear of loſing the object; in the latter, on the loſs, the dear connection formerly ſubſiſting, and reciprocal good offices; and in both caſes pungent ſorrow for any thing, by which we ſuppoſe ourſelves to have diſpleaſed; and in the former, ardent wiſhes to pleaſe.

The

The mind agitated by theſe paſſions, in abſence of the object, ſeeks ſolitude to reflect on its own feelings. In a ſimilar manner may the cauſes and effects of all the paſſions be enumerated.

11. Violent paſſions ſeldom continue long, their violence exhauſts itſelf and produces ſleep, the ſweet compoſer of all feelings; whereas ſtrong but not violent paſſions keep the mind too much wakeful, and often continue a long time. Violent or ſtrong or depreſt feelings agitating the mind for a long time, without ſleep or intermiſſion, generally produce madneſs.

12. The ſame feeling may be pleaſing and agreeable on ſome accounts, and diſpleaſing and diſagreeable on others; and ſimilarly vary in all different ways; or change by innumerable cauſes.

13. Similar feelings may add force to each other, but different ones diminiſh the force of each by withdrawing the attention in ſome degree from it; and much more oppoſite counteract each other; the weaker diminiſhes the ſtrength of the ſtronger: the paſſions may therefore be leſſened by uſing every means of producing others of a different or contrary nature; or if poſſible finding ſome means of removing the cauſe or gratifying it.

14. Repe-

14. Repetition of ſimilar feelings often diminiſhes the attention to them by others intermixing, and thence deſtroys their force. A perſon of great ſympathy by being conſtantly uſed to objects of diſtreſs, becomes callous in ſimilar caſes; as a judge, a phyſician, or ſurgeon, &c.; this is wiſely ordained by nature, for were it otherwiſe, every humane perſon in ſuch neceſſary ſtations would become miſerable by exerciſes of humanity.

15. Senſations of the different ſenſes occurring and actions regularly performed at ſtated times become neceſſary; and the want or defficiency of them at thoſe times, create diſagreeable ſenſations: ſomething ſimilar is true of the feelings, for though repetition without much attention diminiſhes their force, yet the deficiency of that repetition produces uneaſineſs; hence cuſtom and habit influence our obedience, and hence we ſhould guard againſt every vice, againſt reading immoral ſtories unleſs with abhorrence, againſt inhumanity, ſelfiſhneſs, &c.; theſe depreſs human nature, and render us miſerable both in this ſtate of exiſtence and the next; and leſſen our hatred to vice, and regard to virtue: vicious habits take ſuch hold of the mind as not to be ſubdued without the greateſt difficulty, though they tend to miſery and deſtruction; but generally example will ſucceed

better than precept, and alſo the abhorrence excited by reflecting with energy on the evil and miſery produced by them, and the uſing every means of reſtraint poſſible, and every provocation and incitement to actions of a contrary nature, will tend to the ſubjection.

16. Pious and benevolent feelings and inclinations may be increaſed by attention to their cauſes and effects; by reading and hearing of examples of piety and virtue exciting in us fervent emotions of duty and benevolence; and by examples of their oppoſites producing abhorrence and deteſtation; by reading pious, moral and religious books, &c.: theſe different acts and ſentiments will exalt and improve each other.

17. It being in the power of man to vary, to exalt, or debaſe his feelings by his own mode of acting, and conſequently by the underſtanding and will; he becomes the ſubject of moral government; and his feelings, thoughts, words and actions, ſhould be governed by convenience, civility, decency, reaſon, morality and religion, e. g.

1. The violent paſſions ſhould be prevented or reſtrained by arguments of utility, precepts of morality and chriſtianity and their conſolation: the not reſtraining theſe paſſions, adds to their increaſe and frequency.

2. Moral

2. Moral and chriſtian duties may be improved; by paying the ſtricteſt attention to a regular diſcharge of them with the greateſt integrity and ſincerity: e. g. we ſhould take care to fulfil every juſt engagement in the ſenſe that we meant to promiſe, bonâ fide, without any colluſion of mind whatever; promiſes made contrary to morality and religion are conſequently void, and miſtakes ſhould be rectified from principles of benevolence and publick utility: in every action of our lives, the laſt generally of the greateſt importance, the diſpoſal of our effects at death, we ſhould be actuated by principles of juſtice; our juſt debts and proper funeral expences ſhould be paid; and the reſidue diſpoſed of according to the claims of relationſhip, gratitude for favours received, friendſhip, charity, &c.: the claims of children from parents, and parents from children, unleſs forfeited by bad behaviour, are very eminently ſuperior to the claims of other relations: are not all children equally related to their parents, and from thence have an equal claim on them, regard being had to the age, at which they become poſſeſt of the property left, and in ſome caſes to conſiderations of private or publick utility? Is not injuſtice on the death bed, on leaving the world, in the laſt and often the moſt important act of life, originating from pride, of the moſt ſerious concern.

18. The feelings of piety, humility, gratitude and ſobriety, may be exalted by reflecting on the power, wiſdom and goodneſs of the Supreme; on our own unworthineſs and nothingneſs, being framed from duſt and aſhes; on the benefits received, publick as well as private; on our creation, preſervation, on remiſſion of ſins by repentance towards God, and belief in Jeſus Chriſt; on grace, and on the hopes of eternal glory in a future ſtate, according to our behaviour in this.

19. Theſe reflections with prayers, thankſgivings and petitions, agreeable to them offered at ſtated and not unfrequent times, and always with energy of ſoul; will create devout, habitual and virtuous habits of duty; and counteract every vicious inclination.

20. The cauſes of feelings of duty repeated at ſtated times, even without much attention, will on deficient repetition excite an uneaſy diſpoſition of mind.

21. The energy of mind may by degrees excite fervency of devotion equal to the paſſions, and reduce the paſſions to feelings of inferior force.

22. May the time come, when nation ſhall no more wage war with nation; when mankind ſhall perform their reſpective duties in their ſeveral ſtations; and when they ſhall incite each other

other to every devout, good and moral action; and all ſhall treat each other as brethren, and join in promoting their mutual happineſs, both here and hereafter.

23. Inferior feelings productive only of amuſement to the mind, generally paſs away like ſhadows, as ſoon as the object is removed: of this ſort may be ſublimity, beauty, dignity, grace, and all ſlight feelings; when not connected with terror, paſſion or utility; but theſe may by repetition, faſhion, cuſtom or ſome other cauſe or humour influencing the mind, take ſuch hold as to become its principal object, and produce conformable effects.

24. The cauſes of feelings and their effects are aſſociated together, as found by nature or accidents.

1. To conclude this ſubject, reaſon and univerſal experience proclaim every thing exiſting to have a correſpondent cauſe: no argument, no experience ever indicates a probability, and I may even add a poſſibility; that works of the greateſt power, wiſdom and goodneſs can come into exiſtence, can be conſtantly ſupported by weakneſs, ignorance and malevolence; and what is inferior to the greateſt weakneſs and the greateſt ignorance by nothing: a propoſition contradictory in itſelf; which never can be credited but by idiotiſm or madneſs: there muſt neceſſarily be as much power, wiſdom and goodneſs

neſs contained in the cauſe as in the effects; and generally may be concluded much (unleſs contradicted by weakneſs and ignorance contained in them), and in the Creator of the Univerſe infinitely more: from him every thing elſe, mediately or immediately received exiſtence, every thing depends; he is our ſupport, our ſtay, our benefactor, Lord and God.

2. Chance is a word, which has relation to knowledge and ignorance, and not to beings or ſubſtances; to affirm that any thing came by chance is an improper expreſſion, and means only that we are to ſome degree ignorant how it came; but all nature, the power, wiſdom and goodneſs contained in all its works, proclaim aloud with certainty their Creator infinitely powerful, wiſe and good.

3. Has not the Almighty Creator and Governor given laws for the direction of our thoughts and actions?

May not laws be equally promulgated by the eſtabliſhed conſtitution of things (a general language) as by words? The Almighty has publiſhed the laws of inanimate things, which collected from juſt obſervations never deceive; has he not alſo given laws to beings endued with freedom of will and underſtanding, laws to direct their thoughts and voluntary actions? Or is it a thing indifferent in whatever manner a ratio-

a rational being acts? Is no preference to be given to ſome actions or modes of acting before others? Does not all mankind agree in commending gratitude for benefits received, and ſolliciting their continuance by petition and prayer; and in praiſing every benevolent action, which promotes a particular or general good; and in reprobating every thought or action contrary to them? From theſe general principles, the acknowledged voice of all mankind, can from human underſtanding be deduced natural religion, piety, humanity and temperance? But has the Almighty eſtabliſhed laws by the whole rational creation underſtood and aſſented to, of good and evil; and do not all mankind agree in annexing rewards to what are deemed good actions and puniſhment to evil? Do not all legiſlators annex rewards and puniſhments to the performance and breach of their laws; without which the promulgation of them would be folly: has the Supreme eſtabliſhed univerſal laws through the univerſe, and will he not reward or puniſh their performance or tranſgreſſion? Shall they never be enforced? Has he not further inſtilled in every mind, a general belief of a future ſtate of rewards and puniſhments; a belief which always affords pleaſure, in the performance of what is believed to be a good action, and ſor-

row

row or remorſe in what is believed an evil one.—Theſe principles are as general in the rational creation, as the laws of matter in the inanimate one; and will the God of truth deceive us in the one, more than in the other?

5. He is our comforter and friend in every affliction and temptation, in every place and every time; from whom we receive every bleſſing in this life; and from his power and goodneſs derive our hopes of future exiſtence and happineſs: hopes, that afford us a conſtant ſource of conſolation in our paſſage through this world and death; the bare ſuppoſition of their falſity when reflected on with energy, creates in every mind, extreme dread and horror: an aſſured belief of ſuch hopes, would make us account every thing of this world but dung.

6. Every animal is deſirous of continuance in life, and eſteems it ſome degree of happineſs; analogous to this, muſt not every animal, which reflects on futurity be earneſtly deſirous of life in a future ſtate, and particularly of a life given by an infinitely powerful and good being; from whom nothing can proceed but good, unleſs occaſioned by demerit: as it is the deſire of every one to attain eternal life, eternal happineſs; it becomes his intereſt,

his

his duty to purſue thoſe ſteps, that courſe of life, which he believes to contribute to the attainment of it, to be the laws, the commands of the Supreme; but every one that believes in a future judgment, will be deſirous of learning how to eſcape the puniſhment merited, by his diſobedience to the divine laws, by his crimes: from the divine goodneſs, which ever leads to mercy; no doubt, but means will be afforded; from human reaſon, no other can be deviſed than repentance, ſorrow for our ſins and amendment of our lives; but the Almighty will ſuperadd whatever in his infinite goodneſs and mercy may ſeem proper to ſupply their deficiency; his mercy, his goodneſs forgives us our ſins, and gives us the victory, through the mediation and ſufferings of Jeſus Chriſt.

6. Before the coming of Chriſt into the world ſacrifices were almoſt univerſally adopted for the expiation of ſins; but ſoon after his appearance and ſufferings, they were aboliſhed, and a worſhip in ſpirit and truth in general cultivated.

7. No falſe, no abſurd religions ariſing from vices, from various ſources, can invalidate the true; no more than ridiculous and abſurd arguments can refute thoſe, which reaſon and experience clearly diſcover to be true.

ON LANGUAGE.

1. Language is not only uſeful for communicating our ideas to each other, either by converſe, writing or printing; but generally is the baſis of all our knowledge: very few can think or reaſon in their own minds without the words, which expreſs their thoughts tacitly occurring, for it is not neceſſary for theſe purpoſes to hear the ſounds of the words; men think and communicate their ideas to themſelves in language.

2. What may be the caſe of perſons who were born deaf, and have never acquired words, is not eaſy to determine; they may probably have a train of ideas from ſight, which may afford them a ground for thinking, as language does to others, though more imperfectly: there have been inſtances of perſons born deaf, who have been taught to read; ſuch perhaps may be able to acquire the habit of thinking in language: without the uſe of it, our knowledge would be very deficient, we ſhould ſink into the ſtate of brutes.

3. Sounds can never be like any other ſenſations but ſounds; nor is an articulate ſound, framed from a ſimilitude to the ſounds of ſeveral letters conjoined, like any other ſound, that I have

have ever heard: hence articulate ſounds have not the leaſt reſemblance to our ideas excited by them; and a fortiori, the ſounds of the words can never expreſs the leaſt ſimilitude to the ideas excited by the ſeveral words contained in a ſentence, the relations, agreements and diſagreements; and conſequently the ſounds of the words never expreſs our ſentiments, otherwiſe than as arbitrary ſubſtitutions for them—If the words did expreſs the ſentiments, or excite conformable emotions, they muſt be underſtood by every one, who hears them; but will any one read a ſentence to a perſon entirely ignorant of the language, in which it is contained; and ſeriouſly aſk him for the ſentiment or emotion expreſt?

4. In ſome caſes, perhaps, this opinion has originated from the ſame word being often uſed in different meanings; and it not being unuſual to aſſociate the different ideas which the word denotes; e. g. the ſwiftneſs of reading any words can never give the idea of the ſwiftneſs of running, but from aſſociation.

5. By aſſociation the ſounds and ſenſe are connected together: ſimilarly words and tones; different modes of reading as to ſwiftneſs, ſlowneſs, &c. different poſitions of the words and ſentences produce in our minds ideas, relations and feelings, correſpondently to what they have

uſually done in paſt experience: a perſon, who has been accuſtomed to hear devout pſalms ſung, will have devotion excited in his mind from the hearing of ſimilar tones, though he does not underſtand what words are ſung.

6. When perſons converſe, ſtudy, or read; do they reflect on the ſentiments or meaning ſignified by the words, or on the words themſelves? I believe, very ſeldom much on the ſounds of the words, unleſs excited to it by ſomething uncommon; viz. the not underſtanding the meaning from ſome cauſe or other; or ſome peculiarity in the expreſſion: to exemplify, if one perſon ſays to another; will you go with me to London on Wedneſday? The conſideration in the mind of the other, is only the queſtion aſked, the ſentiment, but not the ſounds of the words; will, you, go, &c; and his anſwer will be an agreement, refuſal or doubt, without any attention to the ſounds: the ſame ſentiments being always excited by the ſame words has created a perſuaſion in ſome minds, that ſounds are an echo to the ſenſe.

7. The next enquiry is concerning the pleaſure contained in the ſpeaking and hearing of the ſounds of words.

Firſt, when the meaning of them is not underſtood.

Is

Is there much or any pleaſure received from ſpeaking or hearing ſingle ſyllables, i. e. to us uncompounded ſounds? If there be any ſenſible pleaſure received, is it greater in ſyllables of more clearneſs, ſtrength or weakneſs; in the ſame words conſiſting of as many or as few ſyllables as poſſible; of more vowels or conſonants? If no conſiderable pleaſure is contained in ſpeaking or hearing of ſingle ſyllables, is there much of ſingle words or more conjoined, i. e. ſentences? But if conſiderable is contained in ſpeaking or hearing ſentences, and little in ſingle words; does not the pleaſure ariſe from the underſtanding noticing agreeable and correſpondent lengths of the lines, words, and pauſes, and ſimilarity of ſounds, frequently and regularly occurring with proper variety? The ſame words or ſounds too often recurring will not be pleaſing.

2. The reader ſoon adapts his reading to the occurring ſimilarity, and readily falls into the abovementioned correſpondent pauſes and endings, which perhaps thence create a more pleaſant reading and hearing.

3. But is there much pleaſure contained in the reading or hearing of the moſt harmonious verſification, of metre or rhyme, without a pleaſing meaning conveyed by it to the mind? Read paſſages of Homer, Virgil, Milton or even Pope,

Pope, to a perſon entirely ignorant of the meaning of the words, as I have done, and you will ſoon be convinced of the little pleaſure contained; he will ſoon be weary, and probably inclined to ſleep: thoſe words will commonly be more agreeable, which are more conformable in ſounds to words contained in the language of the hearer; and read in tones correſpondent to it.

4. It has been juſtly obſerved; that no perſon reads well, or gives true force to ſentences, or pleaſure to his auditors, who does not underſtand the meaning of what he reads; i. e. does not read by ſenſe: both this and the little pleaſure received by an unintelligent auditor prove the little force or pleaſure of words, metre or rhyme, independent of the meaning.

5. The meaning of a ſentence will be the ſame on whatever word the emphaſis is placed; the emphaſis denotes the ſuperior force of the idea or thing ſignified by the word, and generally a ſtronger negation of its oppoſite.

8. The next enquiry, which follows in order, will be the pleaſure excited by the harmony or rhyme, when the meaning of the words is, 1. imperfectly, and 2. perfectly underſtood.

1. If the hearer or reader only imperfectly underſtands the meaning of the words; his mind will ſtudy for their meaning, as of the more

more importance, without any attention to the harmony.

2. If he perfectly underſtands the meaning of them; his mind on the firſt reading or hearing will be almoſt principally on their meaning, and very little or not at all reflect on the harmony; though it might have been formerly the object of his ſtudy.

3. A man can ſeldom divide his attention ſo as to fix it much on two ſubjects at the ſame time; for by conſtantly varying his attention from one to the other, he will be a very indifferent maſter of either: if a perſon reads a book or hears any facts related, and another deſires an account of the book or facts: he in anſwer commonly gives an account of the ſentiments contained or related; and ſeldom mentions any thing concerning the ſtyle, harmony or diction, as things leſs worthy of obſervation; but if he does, it is commonly ſomething in general terms concerning the clearneſs and obſcurity of the writer or ſpeaker, as being the moſt material.

4. Whatever pleaſure may be contained in the harmony, it is ſoon forgot; for as ſoon as the words are forgot, the harmony contained in them muſt be ſo too: and therefore the little pleaſure contained in the harmony ſeldom remains longer than the bare time of the reading.

5. I believe

5. I believe very few perſons commonly read verſes aloud to themſelves for the pleaſure of their harmony or ſimilarity of ſounds: and ſtill more few to others, unleſs ſcholars to their maſters; who read them, not for the pleaſure of the ſound of the metre or rhyme to him or themſelves; but for inſtruction of verſification from him in its eſtabliſhed rules often derived from authority and not the ear.

6. The excellence of the harmony, &c. can only be judged by the reading and the ear; the ancients reduced harmony to meaſure or metre, by certain rules: the firſt is, that the times of pronouncing correſpondent lines ſhould be nearly equal; and their parts, pauſes, i. e. emphaſes and accents, in ſome degree analogous: to meaſure the time of pronouncing any line; they aſſumed, as an hypotheſis, the time of pronouncing one long ſyllable to be equal to that of pronouncing two ſhort ones; this cannot be exactly true; for if there be a difference between the times of pronouncing the longeſt ſyllable and the ſhorteſt, there will probably be different intermediate times of pronouncing other ſyllables: two ſhort ſyllables do ſometimes run in ſome degree into each other; and a long one ſometimes lengthens the ſound, and breaks it nearly into two: the time likewiſe depends on the emphaſes, accents and breaks; no rule is given for the meaſure of theſe: there ſhould

ſhould be a ſmall break between every two words, otherwiſe the words will run into each other, and the reading will be indiſtinct; all theſe conſiderations will render the times of reading different correſpondent lines ſomewhat different.

9. It has been aſſerted, that different kind of verſes agree to different ſubjects; verſes of certain forms, viz. lengths, feet and pauſes, beſt expreſs the different paſſions; others are better calculated for narration: from what principles can their forms be deduced, whether from the lengths and pauſes of ſentences generally expreſſive of the paſſions, or applied to narration: but how far are they deducible from nature, and how far from authority and faſhion. The belief of any thing, of which no proof is given from reaſon and nature, may be deemed prejudice, till ſuch a one is deduced, and a conformity to it, named faſhion, whether acquired from education or otherwiſe: no mathematician gives credit to any propoſitions contained in Euclid's Elements from his authority, but from demonſtration; in the ſame manner no credit is to be given to a writer in any ſcience, (matter of fact excepted) but to his proof: truth and demonſtration of it are immutable; whatever is variable, depends on faſhion; how

far is metre variable or different in different places and times?

10. Is not the harmony, the pleaſingneſs of the verſe to be judged by the ear, and not determined by rules? Let a perſon unprejudiced either by education or otherwiſe, read Homer's verſes and judge of their harmony by the ear, and if his ear does not differ from thoſe of ſome others, nothing very pleaſing or harmonious will be excited in it; but perhaps verſification does not create any great degree of pleaſure, independent of the meaning.

11. Can any harmony therefore whatever compenſate for an inverſion of language: no harmony of it can be excellent unleſs it can be eaſily pronounced and underſtood.

12. The compoſition of verſe will be rendered more difficult, the more reſtrained it may be as to pauſes; whether by ſtops, emphaſes, accents, ending of words, length and ſimilarity of ſounds.

Rhyme is generally more difficult than blank verſe, as including both metre and ſimilarity of ſounds; and commonly more agreeable than blank verſe to the young, as I have found by the examination of ſome individuals; does the preference of blank verſe depend on nature, or on the leſſons received in younger days; or on both?

13. Have

13 Have not the Greek and Latin languages from the endings of thoſe ſubſtantives and adjectives, which agree together, having often a ſimilarity of ſounds; and from the words contained in the ſame ſentence, being capable of any poſition whatever; a great advantage in rhyme; though ſeldom or never in uſe with them?

To conclude the great, the grand and almoſt the only uſe of ſpeech, is to convey our ideas, ſentiments, intereſts and purpoſes to each other; and that which does in the moſt clear manner convey ideas, ſentiments and images to the minds of others is to be prefered; as far as thoſe ideas, ſentiments and purpoſes extend.

14. The ſenſes of hearing and ſeeing are the only ones which generally receive ideas from bodies at a conſiderable diſtance, and very imperfectly from bodies in contact; the eye only in the direction to which it points, and the ear in every direction; the eye may ſee, when there is no ſound; and the ear hear, when no viſion.

15. Language being inſtituted as before ſaid for the communication of our ideas to each other: its excellence muſt principally conſiſt in the eaſe of pronunciation and facility of its being underſtood by other perſons and learnt; and its containing the words neceſſary to communicate our ideas, ſentiments and feelings.

16. The vowels being the eaſieſt letters to pronounce; the eaſe of pronounciation of a ſyllable will conſiſt in the greater proportion of vowels to the conſonants, and the fewer letters particularly conſonants, contained in it.

In the firſt reſpect, the Greek is ſuperior in eaſe of pronunciation to the Latin; and the Latin to the Engliſh; and in the ſecond, they are both ſuperior alſo, for they generally contain as many ſyllables as poſſible, and the Engliſh as few; this may perhaps give the Engliſh a greater dignity or ſtrength of ſound, and the Greek a greater ſoftneſs.

17. The facility of a word's being pronounced depends on the facility of the pronunciation of the ſyllables compoſing it; and the facility of a ſentence on that of the words contained, and its not being too long.

18. For the greater eaſe of pronunciation to the ſpeaker; and alſo the communication of his ideas to others with a proper degree of quickneſs; the original words ſhould not be too long; the derivatives which expreſs ſome relation of them, will commonly be ſtill longer.

19. With the uſe of our preſent alphabet, and by one, two or three letters being contained in each ſyllable, and one, two or three ſyllables in each word, there will reſult more different words than compoſe all the languages of Europe;

Europe; but different relations, variety, and other reaſons, admit and even require a further latitude, perhaps three, four or even five letters in a ſyllable, and as many ſyllables in a word; but to this greateſt extent very ſeldom, though there are ſyllables of more letters and words of more ſyllables.

20. It would be much for the eaſe of pronunciation, that two conſonants in the ſame ſyllable ſhould not often follow each other; and that ſome of the moſt difficult in pronouncing ſhould be rejected from the alphabet; but let us not loſe any ſound that we have acquired.

1. Let m and n denote reſpectively the number of vowels and conſonants, then will the number of different ſounds reſulting from one vowel only be m; the number reſulting from two vowels, or one vowel and one conſonant will be $m \times \overline{m-1}$ and $2\,m\,n$ reſpectively; their ſum $= m + m.\,\overline{m-1} + 2\,m\,n = m^2 + 2\,m\,n$.

The number of ſounds from three vowels or two vowels and one conſonant, or one vowel and two conſonants will be $m.\,\overline{m-1}.\,\overline{m-2}$, $3\,m.\,\overline{m-1}.\,n$ and $3\,m \times n \times \overline{n-1}$ reſpectively, of which the ſum is $m^3 + 3\,m^2\,n + 3\,m\,n^2 - 6\,m\,n - 3\,m^2 + 2\,m$, to which add the abovementioned ſum $m^2 + 2\,m\,n$; and there reſults the number

number of all the different ſounds made from one, two or three letters; of which no two in the ſame word are the ſame.

In the ſame manner may eaſily be inveſtigated the number of ſounds, which can be framed from 1, 2, 3, 4, ... x letters; but too many letters can with difficulty be joined in the ſame ſound.

If in the former caſe the ſounds are excepted in which two conſonants are joined together, ſubtract $2\,m.\,n.\overline{n-1}$ from the abovementioned number reſulting.

2. Let N be the number of different ſounds; then will the number of words conſiſting of one, two, three, 4, 5, ... r different ſounds or ſyllables be $N + N.\,\overline{N-1} + N.\,\overline{N-1}.\,\overline{N-2} + N.\,\overline{N-1}.\,\overline{N-2}.\,\overline{N-3} + ... + N.\,\overline{N-1}.\,\overline{N-2}\,..\,\overline{N-r+1}$

Example. Let m, n and r be reſpectively 6, 20 and 2, then will $N = m^2 + 2\,m\,n = 276$; and the number of words reſulting $= N + N \times \overline{N-1} = 276 + 75{,}900 = 76{,}176$.

3. If the word conſiſt of (r) ſyllables, of which α of them be a, β of them be b different to a, γ of them be c different to a and b, δ of them be d, &c.

Let words of the abovementioned kind, be denoted by $a\,\alpha\,b\,\beta\,c\,\gamma\,d\,\delta$, &c.; then the number

ber of the different words of this ſort reſulting from the different ſituation of the ſyllables may be denoted by a fraction, of which the numerator is $r. \overline{r-1} . \overline{r-2} . \overline{r-3} \ldots . 3. 2. 1$, and nominator, $1. 2. 3 .. \alpha \times 1. 2. 3 \ldots \beta \times 1. 2. 3. .. \gamma \times 1. 2. 3. .. \delta \times$ &c.

On ſimilar principles may be inveſtigated the number of words conſiſting of any number of ſyllables; each of which conſiſts of any number of vowels, conſonants; and ſemi-vowels or letters, which placed before a vowel, may be conſidered as a conſonant, and after it as a vowel.

21. If the meaning of the words be not accurately determined, the meaning of the ſentence, i. e. the ſentiment expreſt by them cannot; define therefore the words, contained in the ſentence, and commonly its truth or falſhood will clearly appear: to exemplify this, it has been diſputed how far ſome arts or compoſitions are imitative; define the word imitation clearly and determinately, and it may thence be deduced how far they or any parts of them are correſpondent to it: ſimilarly define tragedy and comedy, and it will be eaſy to determine whether any given ſtory or repreſentation be either tragic or comic or mixt, or neither of them: in the ſame manner define the different kinds of poetry, and it will eaſily appear in what claſs

any

any given compoſition ſhould be placed. Are theſe diſtinctions arbitrary, or deducible from nature, from the ſources of utility and pleaſing? But whatever may be the anſwer to this queſtion, it may be uſeful to diſtinguiſh writings as other works, into a few general ſources; but often ſuch matters are not accurately defined, and admit of great latitude.

22. The meaning of words or paſſages contained in authors, ſhould be determined from authority or ſimilar paſſages: if the ſentiment ſeems low or abſurd, it is a laudable practice amongſt commentators to alter the words, ſo as to improve the ſentiment and render it as excellent as poſſible, conſiſtently with any appearance of truth: but is it commendable to ſpend much time in the correction of words or paſſages; which when corrected, are neither uſeful nor excellent: truth and excellence ſeldom require much time for correction or alteration, they ſpeak for themſelves.

23. The facility of the ſentiment being underſtood by other perſons depends on the voice of the reader or ſpeaker, on its loudneſs and tone being conformable to that in which they have been accuſtomed to hear reading and ſpeaking; it further depends on the different parts, neither being repeated too ſwift for the mind to comprehend each part clearly, nor too ſlow ſo as to occaſion

caſion it to rove to other matters; on an emphaſis being laid on the principal word marking it for attention; on a proper riſe and fall of the voice; on the words repeated being eaſily to be diſtinguiſhed from all other of a different meaning; and laſtly on the words in the ſentence being placed properly, thoſe which are connected with each other together, as the ſubſtantive and its properties; whether natural or accidental; and whatever connects two ſubſtantives, expreſſes their relation being placed between them; the agent preceding when the relation is active, the patient when it is paſſive; this muſt be the caſe when the agent or patient, their properties or attributes, the agency or ſuffering, and the relation is not prædicated by the beginning or ending of the words expreſſing them; the order or meaning may be deduced from the terminations if properly inſtituted; but it will always be preferable, unleſs on account of variety or harmony, to place them in their proper order, it not giving the underſtanding, the trouble of reducing them.

3. Between each ſyllable ſhould be a very ſhort break, between words a greater, and between ſentences a much greater; hence in a line of a given number of ſyllables, the reading cæteris paribus will be ſlower as there are more words contained.

4. The more letters are contained in a ſyllable, the longer generally is the time and the greater the difficulty of pronunciation: if to any ſyllable we add a letter at the beginning, middle or ending of it; we endeavour to add ſomewhat of the ſound of the letter in that place, this renders its pronounciation more difficult and more long.

5. The tones to a ſmall degree probably differ in every age; and conſequently the tones in which we read dead languages, are very unlike thoſe in which they were read when living.

6. The goodneſs of the language muſt be proved by authority from the compoſitions of the beſt writers, from Grammars and Dictionaries; ſome regard being had to utility, otherwiſe no language could ever be improved: the excellence of metre and rhyme ſhould be judged by the ear and not by authority; unleſs that authority deduces the rule from nature, in this caſe, the ear.

7. Particular names are given to the perſons and things with which we are moſt converſant; but if names were given either to every individual ſubſtance, attribute, accident, relation, and connection; the learning and retaining the language, would be impoſſible to man, and would not be uſeful without abſtract or general ideas in general reaſoning; converſe and reaſon-

reaſoning would only relate to particulars; and probably not be underſtood, as both might not be acquainted with the ſame.

8. One word may be made to denote ſome affection of the mind, a very complex idea, or whatever the mind pleaſes; but it muſt be explained to them with whom we converſe, by enumerating its ſimple ideas and their connections.

9. Moſt languages have words, which may expreſs every thing neceſſary in their reſpective ſtates; and if there were not, perſons in a civilized ſtate, would ſoon ſupply the deficiency; this happens when any new plant, earth, metal, animal, country or people, &c. are diſcovered; for names are immediately affixed.

10. Hence no ſentiment expreſſed in Greek but can with equal facility be expreſt in Latin or Engliſh; hence alſo an amazing number of words expreſſing ſubſtances contained in the modern but not in the ancient languages; viz. the number of words for metals, ſemimetals, earths; for plants and animals; amuſements and recreations; operations and tools in agriculture, gardening and various machines; for chemiſtry, a ſcience almoſt unknown to the ancients; anatomy, its words being made principally from the Greek, but we do not count the

primitive Engliſh words only, they are probably few; but every word that is uſed in the Engliſh language, whether coined or taken from the Hebrew, Greek, Latin, French, Spaniſh, Italian, &c. muſt be deemed an Engliſh word; philoſophy; aſtronomy; mathematicks; &c.; medicine; juriſprudence; politics; &c.; in each of theſe ſciences many things are now known, which were unknown to the ancients, in addition to all that were known by them; and therefore a great many words are contained in the Engliſh, which have no correſpondent ones in the Greek, but few in the Greek which have not correſpondent ones in the Engliſh; in a ſimilar manner may we argue concerning the remaining parts of ſpeech.

11. It has been ſaid that ſome languages have many words, which ſignify exactly the ſame thing; is it to be deemed an excellence or a fault; when to avoid the too great copiouſneſs of words, it is neceſſary that many words ſhould have ſeveral, ſometimes very many different meanings, metaphorical, allegorical, figurative, perſonified, relative, &c.; that ſeveral words ſhould ſignify exactly the ſame thing, to the overburthening the memory to no uſeful purpoſe? but does it not ſeem probable that the moderns, having recourſe to all the preſent and

paſt

paſt languages, ſhould be the moſt liable to coin more words expreſſive of the ſame thing, having borrowed them from the different languages? but it is beſt, if they have generally avoided it.

12. It muſt be acknowledged, that the moderns have acquired their ſuperior copiouſneſs of language, by being poſterior; the ſame advantages probably will future ages have of the preſent, if it may be eſteemed any: every people will generally acquire a language correſpondent to their ſtate and time.

13. A great advantage of one language in preference to another is, cæteris paribus, the ſuperior facility of its being learnt; and this is greater in living than dead languages.

The vernacular languages are probably more eaſily learned and underſtood than the Latin and Greek; they are more eaſily learned, becauſe of the many different terminations of the names and verbs contained in the Latin, and particularly in the Greek; and more eaſily underſtood, becauſe their words are placed in a more natural order: future languages will probably copy the moderns in both.

14. Plain and ſimple language is moſt uſeful in conveying knowledge, and in converſe; but figurative often impreſſes ſentiments with greater energy on the mind.

15. Civilized

15. Civilized nations having communications with each other, both by their writings, and otherwiſe; and it being almoſt impoſſible to learn all the different languages, therefore it may be uſeful to eſtabliſh one general language, which ſhould pervade all the different States, and be the means of communicating to each other all uſeful knowledge and inventions; ſuch at preſent in the Latin as before ſaid, which is generally learned by the literati of every place.

Rome, at the ſame time that ſhe extended her conqueſts, rendered her language univerſal.

It is uſeful and neceſſary for merchants, travellers, &c. to learn the language of the nation in which they trade or travel.

16. The greateſt uſe of learning Greek, Hebrew, &c. is the acquiring a critical knowledge in the ſacred writings, to which every thing that is relative bears a relation, has the greateſt conſequence; otherwiſe, would it be worth while for many perſons to ſpend ſeveral years in learning a very difficult language, perhaps the moſt difficult in the world for the knowledge of the arts and ſciences contained in them? It is readily granted that the arts and ſciences received great improvements from the Greeks, but they are all rendered in our own language with great additions, ſo that no one applies to them on that account:

count: would many ſpend ſo much of their time in acquiring the language for the ſentiments, hiſtories, and ſtories contained? thoſe ſentiments, hiſtories, &c. may, and all of much conſequence have been tranſlated: a ſentiment literally tranſlated, will be exactly conformable to the original: for if every word in the tranſlation has preciſely the ſame ideas annext, there can be no difference in the ſentiments; the language in the tranſlation may probably not be elegant and agreeable to the idiom of the original, as the idioms of different languages are different. But will any one waſte his time in ſtudying a language merely for the words contained? If a word in the original has two different meanings, it will probably loſe its falſe wit in the tranſlation; but if it has only one meaning in the original, and two in the tranſlation; it may on the contrary acquire ſimilar wit.

THE PARTS OF SPEECH.

1. The ideas of the mind either are of ſubſtances, and their properties or qualities inherent or accidental; relations, actions, or ſufferings, to which add feelings.

2. The parts of ſpeech are; firſt, noun ſubſtantives, which denote the ſubſtances and feelings; to which add modes, artificial collections of

of ideas, as real ſubſtances are diſtinguiſhed by natural collections; and alſo whatever ſtands by itſelf, and requires not another word to join it.

3. Some particular noun ſubſtances more often uſed in ſpeech, have been diſtinguiſhed by the name of pronouns; as I, thou, he, we, ye, they, &c.; in the ſame maner alſo correſpondent adjectives, many of which are connective.

4. A noun adjective is either a property inherent in the ſubſtantive; or not inherent, but accidently happening to it; which is moſt commonly derived from its having done or ſuffered ſomething, and is called a particle; ſome adjectives are alſo derived from other parts of ſpeech.

5. Verbs are words generally denoting either doing or ſuffering, and conſequently have relation to time.

Time in itſelf is naturally divided into paſt, preſent, or future; but when it has relation to ſome action, or ſuffering, it may have as many tenſes as a perſon pleaſes; it may be as before, paſt, preſent, or future; beginning, middle, or ending; either more or leſs, before or after any of the preceding; and various others: theſe may all relate either to liberty, or obligation; ſuppoſition; certainty or chance, which laſt may either be implied in the expreſſing the chance

chance ſimply, or a wiſh or prayer for it; they may be expreſſed in command or deſire or interrogation, more or leſs for the preſent or future; with many others.

6. The infinitive mood has ſo far the appearance of a ſubſtantive as it ſtands by itſelf, and may be changed into one: for let the verb be the infinitive mood of, to do, or, to be done; we aſk, "to do what;" or "what's to be done?" Let the anſwer be, it; then will the command "to do it," or "it's to be done," both ſignify the ſame, and command the "doing of it," &c.; i. e. to do, or to be done, means the doing of, it; all the tenſes differ only in relation to time, and may be ſo expreſt.

7. There is alſo a verb, which denotes exiſtence, not action or ſuffering; and ſometimes the ſubſtance acting or ſuffering is omitted.

8. Subſtances, adjectives and verbs, as other parts of ſpeech, may generally and mutually be changed into each other: the ſubſtantive into the adjective or verb, by expreſſing a property of another ſubſtantive, ſomewhat ſimilar to a property of it, or an action ſimilar to its actions: the adjectives, verb, &c. may be changed into a ſubſtantive, by ſuppoſing their properties and relations independent of any ſubſtantive, for then they ſtand by themſelves; the adjective may be changed into a verb by ſup-

poſing an action to produce an effect ſimilar to the property of the adjective; and the verb into an adjective by annexing it to a ſubſtance, that is, ſuppoſing it an accidental property belonging to it; and ſimilarly of the reſt.

9. We have few words to expreſs the relations of what are called the ſecondary qualities, when thoſe qualities are different; but when they are ſimilar, we expreſs the compariſon, the greater or greateſt ſtrength or force of the quality in the Engliſh language of them, by affixing *ar*, or, *ſt*, to the end of the word expreſſing it.

10. The words expreſſing the relations of the primary qualities, the underſtanding and will, would be ſo numerous, if a word was affixed to every relation, &c., that it would be impoſſible for any language to contain them; many words in moſt languages are derived from the relations of extenſion and motion, theſe words generally denote a great number of different relations, which the mind collects either from the memory of former inſtructions, or from the ſubſtances between which the relation is contained; and the meaning of the word in caſes allied, in ſome degree, metaphorically: but the metaphors in many caſes are ſo different and ſo indeterminate, having no apparent ſimilarity, that they can hardly be pronounced ſuch;

ſuch; of this, the prepoſitions to, for, from, by, with, &c.; a great number more are examples: it muſt be acknowledged that the mind in reading theſe relations never refers them to any others, of which they are metaphors; and conſequently never conſiders any ſimilitudes between them; they cannot therefore with propriety be called metaphors.

11. What has been advanced in this place may equally be applied to adverbs, relations of verbs, as prepoſitions, and relations of nouns.

12. Conjunctions either join two ſentences together, or ſeparate them; if ſome part of the two ſentences be the ſame, join or ſeparate the remainder and add the common.

13. Theſe prepoſitions, &c. reſpectively having their different meanings in moſt languages expreſt by the ſame word indicates their derivation from the ſame origin, and their uſefulneſs and difficulty argues the origin to be divine.

14. Since no advantage or pleaſure is contained in the reading or hearing of any ſentence whether in proſe, metre or rhyme, without its being underſtood, and underſtood without difficulty: the words whether in proſe, metre, or rhyme muſt be properly arranged, and read by laying proper emphaſes and accents on the principal words and proper pauſes or ſtops between the different ſentences, intermediate or concluſive,

and the relations interpoſed between the things related *A* and *B*; but between theſe things *A* and *B*, may be interpoſed different relations contained between *C* and *D*, *E* and *F*, &c. or facts, which are neceſſary to evince or enforce the truth of the relation contained between *A* and *B*; but ſome or all of the relations between *C* and *D*, *E* and *F*, &c., may be placed after the relation between *A* and *B*, for they will equally prove or enforce that relation however ſituated or arranged, when examined with a ſufficient degree of attention; but the more natural, ſtrong and uniform the order, the relations or things, are placed, the more eaſily will they be apprehended and remembered: between any two things not immediately connected together there ſhould be a proper ſtop or pauſe according to its deficiency of connection.

15. Pauſes or ſtops ſhould only be placed, where the ſenſe requires or at leaſt admits them, and particularly not in the beginning or middle of a word, for it renders one word as it were two; ſome liberty may ſometimes be taken in this caſe, when the ſentence is too long, or for the ſake of verſification, but this is always objectionable.

16. In ſome caſes where the ſubſtantive or action and relation ſtand abſolute without reference to any other, either may be placed firſt,

firſt, for the meaning cannot be miſunderſtood.

17. In languages, of which the conſtruing of ſentences cannot be deduced from the different terminations of the words, the words which have no different terminations ſhould be placed in a proper order to the words, to which they bear relation; but this order is often inverted, and it cannot be entirely reverſed without the confuſion of all language; e. g. the nominative caſe in the Engliſh may be placed between the accuſative and the verb, if they precede the verb; and for a ſimilar reaſon the accuſative between the nominative and verb, when they follow it; but ſometimes, very ſeldom, this order is reverſed in caſes which admit of only one meaning: words related to prepoſitions may commonly be placed in any part of the ſentence; this inverſion of words may ſometimes pleaſe the ear by its variety and harmony: inverſion of language is therefore principally uſed in metre and rhyme.

18. Rhyme cramps the genius or debilitates the ſentiments more than metre, and metre than proſe; for the more a perſon is obliged to ſtudy for words, the leſs regard ean he pay to his ſentiments.

ON THE ACQUISITION OF LANGUAGE AND ALPHABETS.

If mankind were ſituated in a ſtate analogous to the brutes, without knowledge and without language, would they by their faculties acquire ſubſiſtence and language?

1. If they were ſituated in ſuch a ſtate, they would act as the brutes do; no two males would generally aſſociate together; it would be a ſtate of war between them, for the females, food and other cauſes (converſe and known utility being the bond of their mutual aſſociation require language and knowledge); their daily employment would be the ſearch of food; but brutes, by the ſuppoſition in knowledge equal, are much ſuperior in inſtinct more neceſſary for ſuch a ſtate; the earth naturally produces food proper for brutes, but not without culture and cookery much food healthful and neceſſary for man: if we enumerate every article of proviſion in our preſent, what is contained in them that would have afforded us ſubſiſtence in the ſtate deſcribed? We know that, generally, in a great ſcarcity of corn and vegetables, which are only procured by cultivation, in any country, the inhabitants would be famiſhed, unleſs aſſiſted by their neighbours: were a man turned adrift into an uninhabited country

country without tools and ſeeds neceſſary to the cultivation of the ground in order to his ſupport, he would probably ſoon be ſtarved to death; add to this, mankind is not well cloathed and guarded againſt cold and other occurrences; and further, beaſts of prey roving about without controul would ſoon extirpate the human race; or were there no beaſts of prey, other animals would increaſe and multiply ſo much, as to render the procuring of food difficult.

In contradiction to this, there have been two or three inſtances of perſons living in ſuch a ſtate; but no good account has been ever given of the time they were firſt expoſed, or of their manner of living.

2. The care requiſite for rearing a child is ſo much greater and longer in duration, being many years, that the mother would probably forſake the child before it could provide for itſelf; the female in the brute creation generally forſakes its young ſoon after it is impregnated again, at which time, and even on its ſecond and third delivery, when the mother is helpleſs and ſtands in need of aſſiſtance, the child would not be able to procure food and neceſſaries: the mother is generally more weak and diſordered on her lying in than any other female animal, ill ſuited to the ſtate of the child; and perhaps

perhaps her inſtinct is leſs; there are a great many inſtances of women deſtroying their children and forſaking them, even in their ſtate of knowledge and of moral obligation, as well as inſtinct; but few of brutes: further, the cauſe of the mother's dying before the infant could provide for itſelf, would in ſuch a ſtate not be much leſs than the chance of her ſurviving; add to this, the chance of her being attacked by ſickneſs in that time, which would render her incapable of adminiſtering to the infant's wants; and the probability of the death of the child in that interim for want, would be greatly increaſed,

3. Divine providence has placed every animal in a ſtate ſuited to its wants, abilities and nature; in this, great latitude is uſed; they are ſituated in almoſt every ſtate conſiſtent with their exiſtence and well being; but man is no where placed without ſpeech and knowledge proper for him: nature has endowed man with reaſon and underſtanding neceſſary to his ſupport, but not to be acquired without language; by which he deduces and provides from paſt experience, what is neceſſary to his future exiſtence and well being; but does nature ever give latent faculties without affording the proper means of acquiring and uſing; faculties even

neceſſary

neceſſary to his ſupport here and happineſs hereafter.

The Supreme Being when he firſt created terrenæ animals, probably created them in manhood and perfect ſtate, not in infancy in which they could not provide for themſelves; and gave to man language, and to other animals voices neceſſary to their reſpective ſtates; as is agreeable to the Moſaic relation. But if mankind could have ſubſiſted in ſuch a ſtate, could he further have acquired the uſe of language?

4. Is it probable, or even poſſible, when mankind muſt be continually roving about in ſearch of food, and only attentive to their appetites and paſſions; when the mind, though poſſeſt of latent faculties of reaſon and invention, (the improvement and extent of which entirely depend on the exerciſe) has never applied or exerciſed them to any conſiderable degree? Could man in ſuch a ſtate frame a great number of ſounds unuſual to him, and ſubſtitute them for ſubſtances, for their properties inherent or adventitious, for relations, actions and all other parts of ſpeech? He muſt have been a profound metaphyſician ſo as to be maſter of all ideas and their relations contained in the mind and its feelings; he muſt have been ſuperior to all grammarians, having framed the ſounds

for all thoſe ideas, relations and feelings himſelf, and every thing neceſſary for the time; he muſt have ſubſtituted ſome words for an infinite number of different relations, which when applied to a particular ſubſtance or action can only have one meaning: ſubjects which require ſeveral years of a man's life even to learn, who is ultimately ſeldom perfect in the knowledge and philoſophy; could theſe inventions greater, more extenſive, more difficult and uſeful than any ever found by the ſublimeſt genius, in its higheſt cultivation of mind, be invented by mankind in a ſtate little ſuperior to the brutes? At firſt, languages more than neceſſary to his ſupport, to converſe concerning matters in the ſtate in which he is placed, and moral duties, would not be given; he would have the means of adding, when neceſſary.

4. Men would begin to cut likeneſſes of things, either for their amuſement, or for communicating to others, or preſerving the memory of facts; theſe likeneſſes would ſoon after be drawn by fluids on any ſubſtances, which figures drawn by ſome fluids would be found to remain, and hence would be produced ſomething analogous to pen and ink.

The moral laws given to the firſt men would in ſome generations be forgot, debaſed and corrupted; a new revelation would be given of them

them from time to time; but in proper time, on the increaſe, &c. of mankind, it would become neceſſary to give written laws for their general publication and continuance; theſe would probably be given to a diſtinguiſhed people who merited ſuch communication; but ſometime before the publication of theſe laws, an alphabet and reading ſhould be given for the underſtanding of them.

5. An alphabet might be framed from any known language in the following manner.

Obſerve the ſyllables which are eaſieſt of pronounciation in the language, theſe in ſeveral languages will be found to be *a*, *e*, *i*, *o*, *u*; aſſume theſe for firſt letters; then aſſume about ſixteen or twenty of the next eaſieſt, for the ſecond claſs; there is no occaſion to proceed to any further claſs; join two or three (in moſt caſes not more) of theſe letters together, in which, for the eaſe of pronunciation, always include one of the firſt claſs; and try, when joined together quick, or run into each other, what ſound would be produced, and it would be found in general, that they would very ſeldom, if ever, run into one ſound; therefore create a ſound, having ſome likeneſs to the two ſounds, or rather being between them, which ſhould correſpond to ſome ſyllable contained in the language; but if ſome ſyllables contained in the

language are found not to have the leaſt ſimilitude to the ſounds produced by any combination of his letters, for thoſe ſyllables frame a new letter.

Affix marks for the letters as fancy directs, the eaſier, if diſtinguiſhable, the better.

There are two more vowels *y* and *w* contained in our alphabet, which ſeem to be conſonants, when placed before a vowel.

6. Almoſt all the alphabets have probably been borrowed from each other; the Roman not only borrowed, but even took the Greek alphabet, to which they added about four letters; ſo ſome perſon obſerving, what the Greeks in reading always pronounced their vowels *α*; *ε*; *η*; *ι*; *ο*; *ω̃*; *υ*; when they conſtituted a ſyllable alone, took their pronounciation, and thence aroſe the vowels, *a*, *e*, *i*, *o*, *u*; for the *e* long, and *e* ſhort, and *o* long, and *o* ſhort, when pronounced alone became one ſound; they pronounced the conſonants as the Greeks pronounced them, ſome with an *e* before and ſome with an *e* following them; in this enumeration the *z*, and perhaps the *r*, muſt be excepted—the Greeks pronounced moſt of their letters by words of two ſyllables, which is certainly a fault in any alphabet, for it ſeems proper to pronounce the vowels as they are pronounced where they ſtand in a word or conſti-

tute

tute a ſyllable by themſelves, and the conſonants as they read them with a vowel affixed: but the Greeks had a meaning as to the length or accent, as ο—μικρον and ω—μεγα, and ε—ψιλον and υ—ψιλον, and they might in the others, for any thing that is known to the contrary: the Romans alſo took the characters as well as names from the Greek alphabet.

7. The modern alphabets (the Ruſſian excepted) in all polite nations are become nearly the ſame, and probably their languages may for ſome reaſons by degrees approach.

8. Moſt languages have clearly originated from each other, as appears from the correſpondent words and idioms of them.

9. Languages and alphabets, as far as we can judge from hiſtory, ſeem to have been rendered as perfect as neceſſary on their firſt origin, and not to have proceeded gradually, as all human inventions ever muſt.

10. Sentiments and knowledge may be communicated to others, either by writing or printing: where the communication is only from one to another, writing is to be prefered, for we muſt write the copy firſt to have it printed; but where many copies are required to render the knowledge diffuſive, printing is to be prefered, both on account of the leſs trouble and expence, and alſo of the greater correctneſs.

11. In

11. In writing, no man's attention can be ſo fixed as only to attend to the part writing, but it will rove to other parts, and ſometimes to other matters; theſe will often create inaccuracies: but in printing, ſuch inaccuracies will be corrected by one, two or more correctors; but notwithſtanding this ſuperior advantage, errata will ariſe even in printing, through the inattention of the correctors, for they cannot be ſo attentive but that ſome errata will eſcape them; and particularly if the mind be employed on other ſubjects at the ſame time; but if every erratum was corrected, ſome ſmall letters, particularly in mathematics, as in the denominator (I ſpeak from experience and authority) will often drop, and if it be after the laſt correction, will occaſion an erratum in the printed copy; the dropping of one figure or letter, may increaſe or diminiſh a quantity in any given ratio; but this is of no great conſequence, for generally the erratum may be collected, from the quantity, being a particular caſe of a general rule, or the preceding reaſoning; and every intelligent reader will underſtand, and cannot miſtake.

12. In regard to future editions of books or writings, it may be obſerved that as long as the original continues legible, and the language perfectly intelligible, ſo long may the memory of

of them be ſaid to remain exact; but when they depend on written or printed copies, &c. ſome few errata from the abovementioned ſources, moſt probably of no great conſequence, are to be expected.

13. All perſons for want of leiſure, time and means, have it not in their power to procure the artificial language of reading and writing, but the preſent inſtitutions of ſome benevolent perſons will, I hope, in time, greatly diminiſh this evil.

14. Various cauſes may injure the hearing or occaſion impediments of ſpeech; the latter may happen either from a fault of the organ, or when the organ is perfect, from being brought up and educated with ſome who have an impediment themſelves, or a different tone of voice, and other cauſes; when this is the caſe, age and converſe of others of a proper tone may often produce a cure; or the endeavouring, deliberation, attention and every effort to pronounce the difficult words as plain as we poſſibly can: quære, whether Demoſthenes was not cured more by this method, and time, than by the pebbles.

15. Impediment of ſpeech and probably any default in a man's body or voice, generally produces baſhfulneſs; and the former, with weakneſs of voice, is a ſure bar to a perſon excelling in public.

16. In

16. In default of hearing, an artificial language may be ſubſtituted from the ſight; and in default of both hearing and ſeeing, one from the touch; but deplorable is the ſituation of thoſe who can neither hear nor ſee, a ſtate to which old age approaches, for the ſight becomes dim and the hearing dull.

Should it pleaſe Providence thus to deprive me of the uſe of my faculties, may I ſubmit with humble reſignation. May I for the future lead a life better in practice, and more fervent in devotion to the Supreme Being; and may God grant me his grace here, and pardon of my ſins, when the trumpet of the great Archangel ſhall ſummon me to life again, and to judgment.

ADDENDA.

ADDENDA.

Page 49. 1. Let $N\,2$, $N\,3$, $N\,4$, $N\,5$, ..., $N\,\overline{m-2}$, $N\,\overline{m-1}$, $N\,m$ be the reſpective number of ways that 2, 3, 4, 5, ..., $m-2$, $m-1$ and m letters can, in the ſame number (m) of letters, each of them be placed out of their reſpective places; then will $N\,2 = 1$, $N\,3 = 1.2.3-1-3.\frac{2}{2} \times N\,2\,(3) = 6-1-3 = 2$, $N\,4 = 1.2.3.4-1-4 \times \frac{3}{2} \times N\,2\,(6) - 4.\frac{3}{2}.\frac{2}{3} \times N\,3\,(8) = 24-1-6-8 = 9$, $N\,5 = 1.2.3.4.5.-1-5.\frac{4}{2} \times N\,2.(10) - 5.\frac{4}{2}.\frac{3}{3} \times N\,3\,(20) - 5.\frac{4}{2}.\frac{3}{3}.\frac{2}{4} \times N\,4\,(45) = 120-1-10-20-45 = 44$, ..., $N\,m = 1.2.3 \ldots m-1 - m.\frac{m-1}{2} \times N\,2 - m.\frac{m-1}{2}.\frac{m-2}{3} \times N\,3 - m.\frac{m-1}{2}.\frac{m-2}{3}.\frac{m-3}{4} \times N\,4 - \ldots\ldots - m.\frac{m-1}{2}.\frac{m-2}{3}.\frac{m-3}{4} \ldots \frac{3}{m-2} \times N\,\overline{m-2} - m.\frac{m-1}{2}.\frac{m-2}{3} \ldots \frac{3}{m-2} \times \frac{2}{m-1} \times N\,\overline{m-1}$.

2. The number of ways that m letters only, contained in n, can be out of their places, will be $n.\frac{n-1}{2}.\frac{n-2}{3}.\frac{n-3}{4} \ldots \frac{n-m+1}{m} + N\,m$: the

number of all the ways poſſible for the letters being in or out of their places is $n \cdot \frac{n-1}{2} \cdot \frac{n-2}{3} \cdots 4 \cdot 3 \cdot 2 = L$; the chance of the happening of any of theſe events is equal to their number divided by L.

Hence by Mr. De Moivre's elegant problem on this ſubject,

$$\frac{N\,m}{1.2.3.4.5 \ldots m-2 \cdot m-1 \cdot m} = \frac{1}{2} - \frac{1}{2.3} + \frac{1}{2.3.4} - \frac{1}{2.3.4.5} + \ldots \pm \frac{1}{2.3.4.5 \ldots m}.$$

3. The chance of r given letters out of n being contained in their places is $\frac{1}{n \cdot n-1 \cdot n-2 \cdot n-3 \ldots n-r+1}$.

Cor. Hence the number of letters being infinite; the odds will not be ſo much as two to one againſt the whole number being out of their places; but the odds will be infinite $\times^d$ into infinite $\times^d$ into infinite $\times$, &c. ad infinitum to one againſt the whole number being in their places; and infinite raiſed to any power l to one nearly againſt any l given ones being conſtituted in their places; hence their being conſtituted in order, proves a deſign.

4. By

ADDENDA.

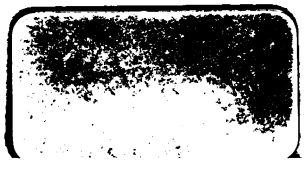
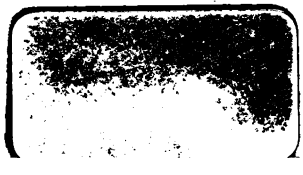
4. By adding more of theſe numbers together, we ſhall find the ſum of the number of ways that m, r, f, &c.; or 2, 3, 4, .. m letters out of n can only be out of their places.

The ſame principles may be applied in ſimilar caſes, when the number of letters of one ſpecies be h, of a ſecond k, of a third l, &c.

Sm will always be diviſible by $m-1$.

Page 109. Reaumeur, diſcovered the velocity of light, from which Bradley accounted for the aberration of the fixed ſtars.

Page 166 and 171. The near repreſentation of a given object is a thing of which every man can judge: a ſpecific figure, by which I mean a fair repreſentation of the ſpecies, ſhould be formed from a great number of particulars: a characteriſtic form to expreſs any one excellence the ſpecies is capable of, will be beſt taken from ſome individual of the ſpecies eminent for that excellence: in theſe two laſt caſes the ſtudy and obſervation of nature are neceſſary to enable a perſon to judge.

CORRIGENDA.

PAGE 8. l. 6 and 7, *for* the picture on the retina is, *read* their pictures on the retina are. l. 10. *for* the object ſubtends at the eye, the, *read*, an object ſubtends at the eye, its. p. 26. l. 13. *for* ſeem, *read* ſeems. p. 41. l. 4. *for* from, *read* deducible from. p. 48. l. 4. *for* a being, *read* beings. p. 56. l. 5. *dele* ſelf. p. 74. l. 16. *for* annexed, *read* annexed to it. p. 79. l. 15. *for* extends, *read* extend. p. 80. l. 11. *for* and, *read* and he. p. 100. l. 5. *dele* ,. p. 106. l. 20. *for* minds, *read* mind. p. 107. l. 9. *read* philoſophy are. p. 133. l. 20. *for* principal, *read* principle. p. 120. l. 22. *dele* in. p. 128. l. 22 and 23. *dele* war in. p. 133. l. 22. *for* deems, *read* deem. p. 134. l. 6. *for* ſuch, *read* are ſuch. l. 14. *dele* is. p. 196. l. 3. *after* wiſdom, *read* benevolence.